# TELEPHONY

THE JOURNAL OF THE TELEPHONE INDUSTRY

JULY 26, 1941

VOLUME 121

NUMBER 4

# Answering the nation's call!

"Hurry! Hurry! Hurry!" is the order of the day. That's why the telephone now stands in the front line of national defense.

Vast supplies of telephone apparatus are being rushed for the Bell System to meet the increasing needs of our armed forces and defense industries. In addition, specialized communication equipment of many kinds is being produced in great quantities and at top speed for our Army, Navy and Marine Corps. Western Electric's long experience and manufacturing facilities are helping to meet these vital needs in record time.

Under the conditions, our efforts to give prompt service to *all* our customers may sometimes prove unavailing. But we're sure you'll agree that Uncle Sam comes first.

**Western Electric**

TELEPHONY, July 26, 1941. Volume 121. No. 4. Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 So. Dearborn St., Chicago, Ill. Telephone Wabash 8604. Subscription $3.00 per year. Entered as second class matter September 4, 1908, at the Post Office at Chicago, Ill., under the act of March 3, 1879.

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This is the *HEART* of Stromberg-Carlson RELAYDIAL

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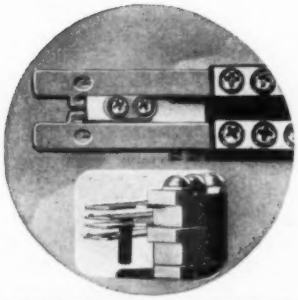

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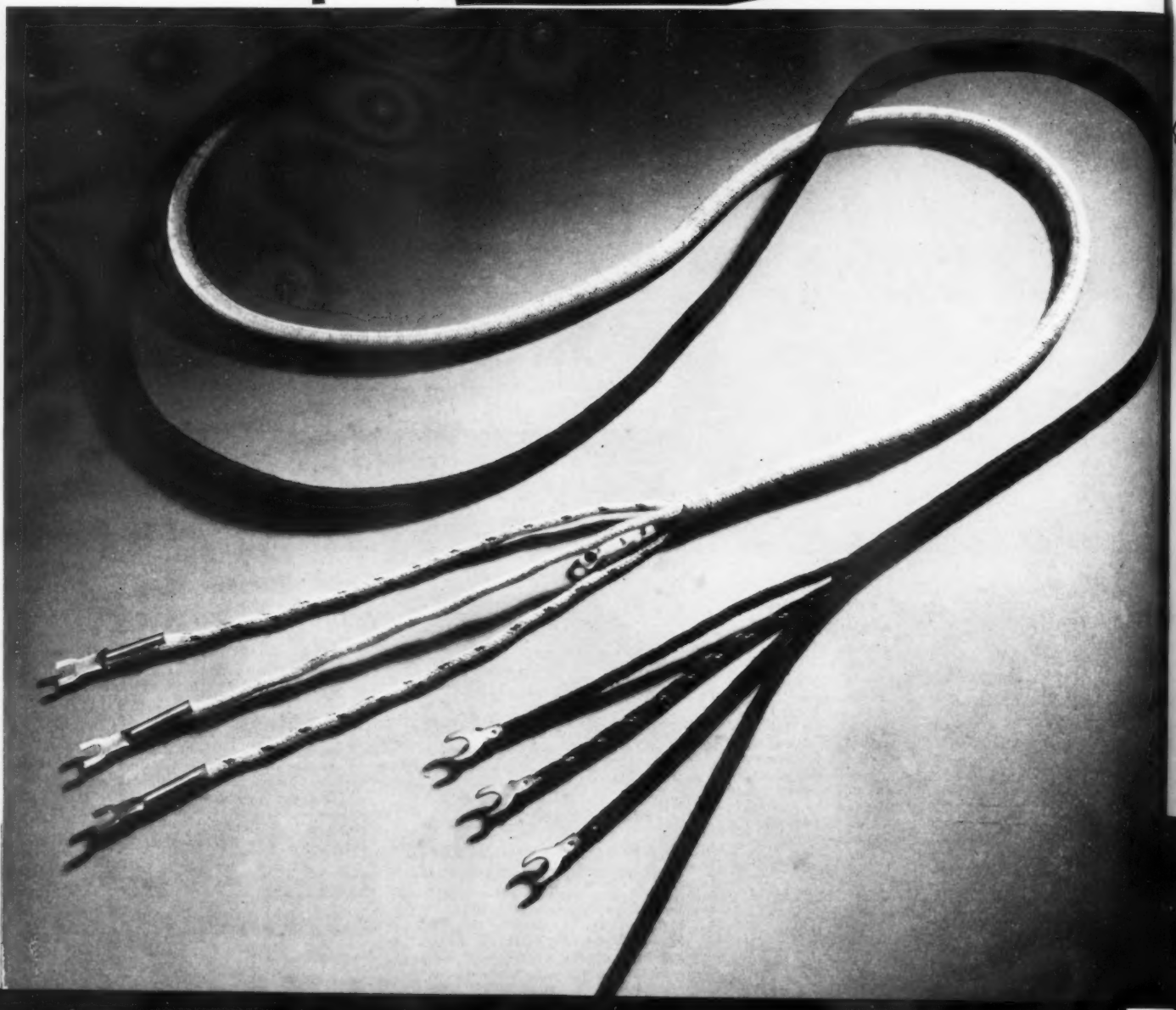

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A standard Kellogg Switchboard Cord which had been rebutted once was placed in service on cord pair No. 5 of position No. 13, in the answering location.

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If a penny or two saving on the selling price will tempt you to use some other cord, make a comparison test on your own switchboard . . . and see how much more it may be costing you to save that penny or two.

KELLOGG SWITCHBOARD & SUPPLY COMPANY, CHICAGO

**KELLOGG EXTRA LONG LIFE Cords**

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# SUPERIOR QUALITY OF LEICH'S COMPLETE LINE OF MATERIALS

The heavy protective coating of galvanizing, the exceptional tensile strength, and the unusually high conductivity of Amertel telephone wire have made it the preferred conductor of hundreds of telephone companies. With Amertel, telephone men have constructed thousands of miles of the finest rural telephone lines the industry has ever known.

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There's a Nicopress Reducing Sleeve, made exact to size, for most of the popular communication size wires.

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Nicopress Reducing Sleeve

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MAKE IT A *Nicopress* SPLICE



# Telephony

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# EMPLOYES GENERATE GOOD

# *Public Relations*

**By H. J. HUETHER**
General Commercial Superintendent,
Pennsylvania Telephone Corp., Erie

**In every contact with customers, those working for the telephone company can, by a friendly attitude, impress the public that they have a desire to serve. Public relations is the result of doing a good service job.**

IN THIS discussion, we will assume that public relations are designed to give a business a good reputation with the public, establish it in the public mind as an institution of character and one which functions in the public interest.

Public relations simply means good will; it is the reaction of the public toward the telephone company—its relations with the public. There are good and bad public relations. What any business wants and needs is good public relations.

What is good public relations? Is it just talk? Is it trying to convince people by word of mouth that the telephone organization is a fine outfit? Or, from another angle—is it helping an old lady across a busy intersection or running after some old gentleman's hat on a windy day? In other words—is it a matter of doing special stunts to try to make an impression? *The answer is No.*

Before we go on, let's keep the record straight. We don't mean for a minute that we should not help that old lady across the street—we don't mean that we should not chase the old gentleman's hat. Anybody with any humanity in his soul would do those things. And it does not mean that a telephone truck should not give every courtesy on the road. Every gentlemanly driver should do that. But, if we must depend exclusively on such activities to secure good public relations then we are in a sorry way.

Public relations is not a conscious thing which can be put in a bin with a label. It cannot be kept under the counter or in a desk drawer for use when it is needed. It isn't something that can be ladled out and fed to the public with a spoon. *Public relations is an effect. It is a result. Bad public relations is the result of not doing a good service job. Good public relations is a result of doing a good telephone operations job—it is as simple as arithmetic.*

Good service equals good public relations. A good service job means a courteous, honest, complete and satisfactory job. We must do the service job in such a way that good public relations will be a by-product —a by-product as important as the service product—and we must have that by-product coming out of every contact.

We must constantly keep our eyes open to the effect of our service job. When the effect is a complaint, we have an opportunity to find out something. We can find out whether there is some practice which needs to be changed; whether someone in the organization has made a slip; whether one of us may need additional training or information, or whether some piece of equipment should be changed. So we study the effects of the service job so that the people who come to us for their communication needs will be completely satisfied.

H. J. HUETHER

We have an obligation to the public over and above the service job. We believe that we should let it know our aims and our service objectives. We also should tell it about the policies under which we operate,

to keep it informed of the state of the business. Furthermore, we want it to understand the set-up of the organization which provides the service.

A service job is much more effective if the customer has some understanding of the problems of the business. We should accept such opportunities as come to us as an organization to explain these things which people want to know or should know about the business.

We can't laugh off this subject of public relations—it is deadly serious. It is what every business man must think about if he is to be lastingly successful. If you owned the telephone business personally, you would give plenty of thought to how your customers felt about your business. It is just that serious to your company, which, after all, really means you. It is just plain old-fashioned horse sense that the people we serve must be so served that they like the way they are being served.

Most of our day-by-day relations with the public are not conducted by the management, but by employes. Salesmen, clerks, repairmen, installers, and telephone operators are the people who largely represent our business to the public. A company may have the best overall public policy in the world in the mind of the management, but if the spirit of it is not translated into acts by employes who represent the company to the public, the policy will be largely discounted.

Each and every employe has the power to bring about better public relations. Let's take the operator first. What chance has she to make the public favorable to the telephone company?

The public is a wise crowd. It distinguishes between the sincere and the insincere. "Number, please?" can be said with the same accent, the same tone, and yet it can convey to the public widely different meanings. It can say, "Well, what do you want to know?" or "I am glad of this opportunity to be of service to you." If the voice of the operator shows that the latter thought is in her heart, the public quickly gets the idea and public relations benefit.

When a plant man enters a home or office to install or repair a telephone, he has a wonderful opportunity to convince the subscriber that telephone people are a pretty good crowd. He gets right into the home—he is the telephone doctor. Somebody said that physicians have greater moral influence than ministers because they get into such close contact with the people. The plant man who goes into a subscriber's home bears a somewhat similar relation to the commercial man as does the doctor to the minister.

The subscriber usually calls on the commercial man, but the plant man goes into the subscriber's home and the impression which the plant man makes on the subscriber is the real and lasting impression, for, to the subscriber, *he* is the telephone company. How good an impression he creates depends on his attitude, the neatness of his work, the sincerity of his desire to serve. "It is the little things that count."

The business office employe has more daily face-to-face contacts with the public than any other person in the telephone company; therefore, his or her attitude toward the public has a great deal to do with the public's attitude toward the company.

He does not need something big which must be pulled out of the air. Just the little things, like the tone of voice with which he answers the telephone and the attitude with which he meets the subscriber at the counter.

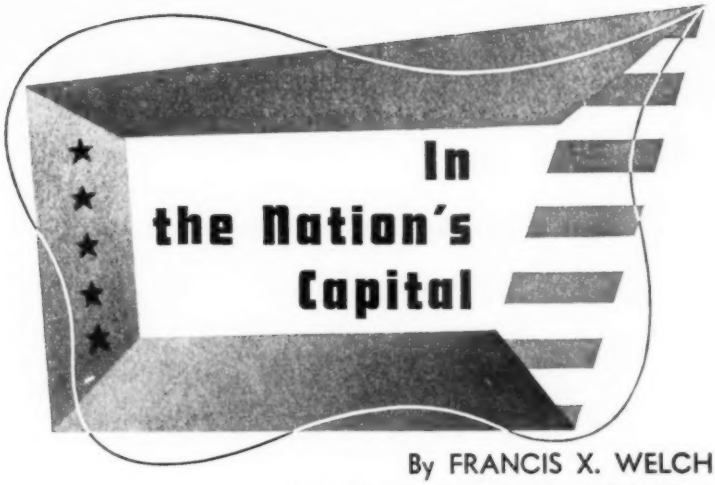
If there is one thing which is necessary in a commercial office, it is patience. Telephone people speak a language of their own. Words and phrases which are perfectly clear to us are often not understood by the public and we must take the time to make ourselves understood. We must take the time to fully and completely satisfy the customer. Down deep we must feel a desire to serve. We must not make a display of this desire. If the feeling is there, it will show itself and the public will recognize it.

There must be teamwork within the telephone organization. Time was when there was a lot of departmental thinking in the telephone business. Even today we hear some of the following expressions: "Oh, that is a commercial matter," or "We'll have to take that up with the plant department," or "Well, you know the traffic department is responsible for service." The public knows nothing about our departments or divisions and cares less. The public wants service and to the public you represent the company which furnishes that service.

We know a lot about good telephone service. Over a period of years we have learned many things. Those years of experience are boiled down into training courses and instruction methods, all tending to-

*(Please turn to page 31)*

"I just know my bill is here somewhere. But isn't it a sight how much these pocketbooks will hold?"




By FRANCIS X. WELCH
Washington Correspondent for TELEPHONY

**USITA defense committee meets with priority and military officials in Washington to discuss telephone industry's need for preferred priority rating to maintain present high standard of service. Governmental representatives sympathetic to industry's position and has committee's recommendations under consideration.**

THE Defense Advisory Committee of the United States Independent Telephone Association came to Washington last week and spent a busy three days making the rounds of conferences with Federal defense authorities. The committee, which included Carl Brorein, USITA president, J. H. Agee, E. C. Blomeyer, Gustav Hirsch, J. F. O'Connell, and Louis Pitcher, had an interesting and probably a profitable trip as far as the interests of the Independent telephone industry were concerned. Appointments were arranged through the USITA regular representative in Washington, Clyde S. Bailey.

Among other personages with whom the committee visited were Chairman Fly of the FCC, Maj. Gen. J. O. Mauborgne (Signal Corps Chief), and Brig. Gen. L. D. Gasser. These conferences had mostly to do with various phases of possible cooperation by the Independent telephone industry with direct defense activities, such as the Army's civilian aircraft warning service and the anti-sabotage work of the Defense Communications Board.

But the most pressing task of the committee for the moment, and the one upon which it concentrated its principal effort, was the matter of obtaining desirable preferences for the industry in the manufacture of telephone equipment with respect to obtaining scarce raw materials.

OPM and OPACS had already agreed upon a rating of A-10 for repair and maintenance supplies for the various public utilities and other essential industries listed in the allocation program announced by OPACS on July 1. (*This tentative agreement is also reported to contain a rating of A-1-a for "emergency breakdowns" for such industries.*) In other words, this rating, which is very high indeed, simply carries out in detail the preferences for essential public services in obtaining scarce materials which OPACS had earlier announced in more general terms.

However, the division of authority between OPM and OPACS is such that this agreement must be formally promulgated by OPM before it becomes effective. There is yet the possibility that OPM may modify the agreement at the last minute; but actual promulgation of it was expected as soon as the proper officials could "get around to it."

As previously stated in this department, this preference, desirable as it may seem as far as it goes, still falls short not only of meeting all demands of the industry, but even of sustaining the present efficient standard of service, aside from new extensions of outside plant. The OPACS preference is limited to actual maintenance and replacement of established facilities. It does not provide for any plant extensions, expansions, or improvements which cannot be shown to be directly connected with actual defense activity (in which case, of course, it might get an even higher "A" rating).

This was the issue which the USITA committee threshed out with officials of OPM and OPACS. In the course of their visitation they saw E. R. Stettinius, Jr., OPM director of priorities, Joseph Overlock and James O'Neal, OPM consultants, Leighton Peebles and Robert Berner, OPACS representatives. A joint conference was held with both the OPM and OPACS men. The problems and objectives of the government and of the industry were clarified; and ideas on both sides were cordially exchanged and sympathetically received.

As near as your correspondent can grasp the import of the meeting, the position of the government is something like this:

(1) Direct defense activities have first call on scarce materials before civilian operations can be considered, even to the extent of maintenance. However, it is obvious that some tele-

phone industrial operations are directly connected with defense, such as the installation of an Army camp system or the manufacture of ship-to-shore, plane-to-port communications equipment. Whether telephone work *is* directly connected with defense is a question which must be determined separately in the case of each project, after which proper priority classification will be accorded.

(2) The maintenance of *existing* telephone service is recognized as being so intimately tied up with the nation's defense effort as to give it a high preferred rating. This rating extends only to maintenance and repair.

(3) New extensions or expansions of plant, whether inside or outside, which are not connected with defense may *not* be given a preferred rating. They will have to wait in line for scarce materials, or else the industry will have to manage the best way it can on alternate materials. In other words, business-as-usual is *out*.

The industry's point of view, as presented by the committee, was, in effect, something like this:

(1) The Independent telephone industry does not seek any preferential treatment for new business which cannot be classified as connected with defense. It will handle such new business to the extent of its capacity and available stocks and equipment. But it recognizes that much of the civilian new business that may present itself in future months may be of questionable soundness. That is, it may be stimulated by boom activity or other artificial circumstances which would leave the industry in an over-expanded and economically weakened condition after the defense effort is over.

(To this extent, the industry might some day have reason to welcome the authority of the government as a shield against unwarranted criticism for failure to make wasteful or indiscriminate extensions of non-defense service, and as a possible protection against regulatory requirements in some states, in the event that an actual equipment shortage ultimately develops.)

(2) But the industry feels that certain improvements and expansions of plant equipment will eventually be necessary *to maintain the present standard of service,* even with respect to subscribers already connected or those new subscribers who have a defense rating. This is because of the rapidly rising volume of both toll and exchange traffic as a result of defense activity.

(3) Specifically, the industry would like to have this concept of the "standard of service" included in the OPACS definition of maintenance and repair—with a corresponding preference for the industry's requirements of scarce materials. In detail, it was suggested that toll circuits and new central office equipment which might be necessary to take care of this increasing traffic should be given a preferential rating.

(4) It was conceded that under circumstances of actual inability to meet total business requirements through the scarcity of telephone equipment, a systematic grading of new prospective subscribers, as between defense and non-defense activities, would automatically relieve the demands on the central office and toll equipment *to some extent*—but would not offset, by any means, the increased demands resulting from rising volume of traffic already noted.

In this connection, some suggestion was made that the government might work out some rules or some formula for grading customers under such circumstances, so as to relieve the telephone company from the burden of distinctions between different classes of subscribers on its own responsibility (with the possible liability that might accrue).

What came of this exchange of viewpoints? Well, it is too early for definite development. But the outlook can be viewed with some optimism.

Government defense officials seemed impressed with the argument that toll plant and central office equipment might well be viewed as part of "maintenance" for the "standard of service" for *necessary* requirements of the telephone business. The idea that the government should take the responsibility for working out service restrictions which it may be necessary to impose against *unnecessary* requirements of the industry during the present emergency will have to be further explored. But we will probably hear more about it.

The industry's representatives, on the other hand, were impressed with the serious problem of the government in conserving the resources necessary for defense. For example, OPM representatives wanted to know just what proportion of the telephone industry's total requirements (including not only maintenance and new defense work, but also new non-defense work and all types of civilian demand) would be placed under a preferential rating for scarce materials, if the government *accepted* the suggestion that toll circuits and central office equipment should be preferred under the so-called "standard of service" concept. This percentage, of course, would have to be augmented by an additional percentage of priority in favor of direct defense telephone requirements.

Some tentative figures were discussed, but this precise line of inquiry had not been developed sufficiently to make the publication of any percentage figures very reliable at this time. It is clear, however, that the government's problem is a practical one — in terms of actual tons needed of aluminum, tungsten, nickel, copper, etc.

Thus, if the priority treatment sought by the industry would place less than half of the industry's total requirements under preferential rating, that would earmark so many *less* tons of needed materials, as compared with the situation that would result if the committee's proposal amounted to putting as much as 60 per cent or 70 per cent of the industry's total requirements under a

## Priority, Military Officials Sympathetic to Industry's Needs

In an interview on July 21, with Louis Pitcher, executive vice-president, United States Independent Telephone Association, who had just returned from Washington—where conferences were had between the National Defense Coordinating Committee of the association and OPM and OPACS (see page 13)—TELEPHONY learns that the reception given the committee was most cordial on the part of both of these departmental organizations as well as at conferences with Chairman James L. Fly of the FCC; Maj. Gen. J. O. Mauborgne, Chief Signal Officer of the United States Army, and Maj. Gen. L. D. Gasser of the committee on Aircraft Warning Service, of which Mayor LaGuardia of New York is chairman.

The sympathetic understanding of the problems of the Independent telephone industry by the governmental authorities visited at Washington indicates that a consideration will be given to granting a preferred priority status to the entire telephone industry in the securing of materials necessary for maintenance and repair for switchboard needs of all kinds and for the increase of toll line facilities, Mr. Pitcher stated.

The government, particularly the Army, wants no breakdown in the character of the telephone service furnished the American public, recognizing the fact that the heavy burden of traffic now being placed upon operating companies is largely due to the national defense program, Mr. Pitcher said.

high priority rating. In other words, principles and formulas are all very well as far as they go, but the government has to keep its eyes on actual tonnage.

* * *

On the basis of these conferences, it did not appear likely, that OPACS and OPM would make any immediate modification in their public service industry's preferential order as a result of the USITA committee conference. If any action is taken along this line, it will probably have to await special supplemental procedure.

There are a number of problems that will have to be worked out: The matter of classifying subscribers, if worse comes to worse, is bound to be a ticklish subject. It would be obviously dangerous for the telephone company itself to attempt to draw any distinction between rendering service to: (1) a grocery store, (2) a rolling mill, (3) a hairdressing establishment, (4) an opera singer.

And while it is hoped that the proposed priority in favor of long distance service, as distinguished from local service, will avoid even the ultimate possibility of a breakdown in the present high standard of toll service, it is important to remember that the Communications Act, as now written, gives the government priority rights as to traffic over telephone and telegraph lines in case of war.

Obviously, trying to give government messages the right of way over toll circuits—if we have to come to that—is not going to be an easy matter to solve. Clearly, the mere supervision of the location of the telephone instrument would not be sufficient. A long-distance call by an official like William Knudsen from the golf course of a country club might be far more important than a social call from some second lieutenant stationed at a general Army headquarters. Working out code numbers is one possibility. But those troubles are somewhat in the future.

Some idea of the rapid increase in long distance telephone calls from Washington and its environs can be seen in the following comparison: In the spring of 1940, there were 11,500 long distance calls a day; on Christmas of 1940, there were 19,000 calls; as of July 18, 1941, there were 22,000 calls.

The increasing volume on the Washington central exchange board is also reflected in the following paragraphs which recently appeared in the *Washington Daily News*:

"Local calls have risen 400,000 a day in recent months to an incredible daily total of more than 1,800,000. Figuring each, that means that between us we spend about five years a day on the telephone.

"A little matter of 100,000 miles of wire (many wires to the cable, of course) were put in service between January 1 and May 15. That adds up to 250 trips to Boston and back. Last year it was only 40,000. All in all, construction work and new equipment this year will amount to $15,000,000—twice the cost of all company equipment in 1917.

"The government alone uses 58,500

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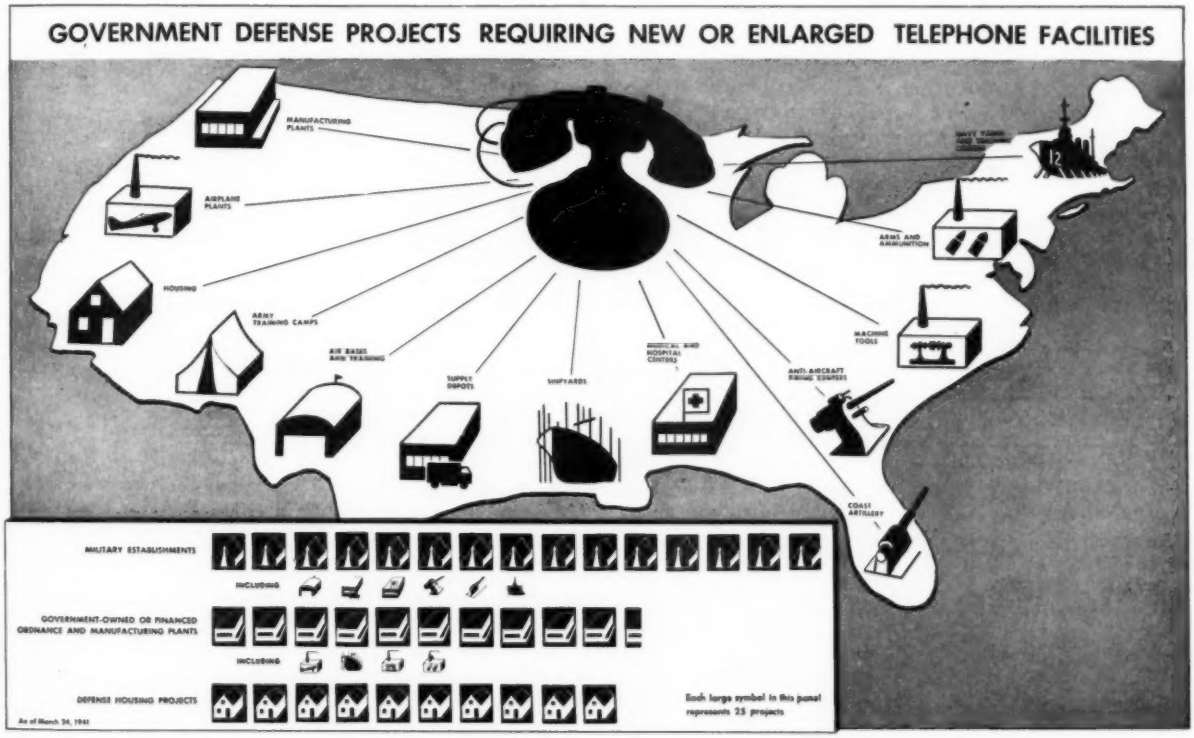


This illustration was one of many used in a very attractive and interesting 48-page magazine entitled, "ALL OUT for Defense," published recently by the American Telephone & Telegraph Co. and associated companies. The magazine cover was appropriately printed in red, white and blue colors. Especially designed to depict the nation's defense effort and the importance of telephone communication in achieving this effort, the magazine is beautifully illustrated with photographs. Attention is directed to defense activities of various branches of the United States government for the defense, welfare and protection of this country—the Army, the Navy, the Air Corps—as well as to underlying forces of such effort—the people, who are working to build up this country's defenses. It is pointed out that the telephone works night and day to help builders build arsenals, factories, and ordnance plants. Pictures show that the farmers are providing food for the country's needs. In fact, the use of the telephone from coast to coast is depicted in photographs throughout this magazine.

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(To this extent, the industry might some day have reason to welcome the authority of the government as a shield against unwarranted criticism for failure to make wasteful or indiscriminate extensions of non-defense service, and as a possible protection against regulatory requirements in some states, in the event that an actual equipment shortage ultimately develops.)

(2) But the industry feels that certain improvements and expansions of plant equipment will eventually be necessary *to maintain the present standard of service,* even with respect to subscribers already connected or those new subscribers who have a defense rating. This is because of the rapidly rising volume of both toll and exchange traffic as a result of defense activity.

(3) Specifically, the industry would like to have this concept of the "standard of service" included in the OPACS definition of maintenance and repair—with a corresponding preference for the industry's requirements of scarce materials. In detail, it was suggested that toll circuits and new central office equipment which might be necessary to take care of this increasing traffic should be given a preferential rating.

(4) It was conceded that under circumstances of actual inability to meet total business requirements through the scarcity of telephone equipment, a systematic grading of new prospective subscribers, as between defense and non-defense activities, would automatically relieve the demands on the central office and toll equipment *to some extent*—but would not offset, by any means, the increased demands resulting from rising volume of traffic already noted.

In this connection, some suggestion was made that the government might work out some rules or some formula for grading customers under such circumstances, so as to relieve the telephone company from the burden of distinctions between different classes of subscribers on its own responsibility (with the possible liability that might accrue).

What came of this exchange of viewpoints? Well, it is too early for definite development. But the outlook can be viewed with some optimism.

Government defense officials seemed impressed with the argument that toll plant and central office equipment might well be viewed as part of "maintenance" for the "standard of service" for *necessary* requirements of the telephone business. The idea that the government should take the responsibility for working out service restrictions which it may be necessary to impose against *unnecessary* requirements of the industry during the present emergency will have to be further explored. But we will probably hear more about it.

The industry's representatives, on the other hand, were impressed with the serious problem of the government in conserving the resources necessary for defense. For example, OPM representatives wanted to know just what proportion of the telephone industry's total requirements (including not only maintenance and new defense work, but also new non-defense work and all types of civilian demand) would be placed under a preferential rating for scarce materials, if the government *accepted* the suggestion that toll circuits and central office equipment should be preferred under the so-called "standard of service" concept. This percentage, of course, would have to be augmented by an additional percentage of priority in favor of direct defense telephone requirements.

Some tentative figures were discussed, but this precise line of inquiry had not been developed sufficiently to make the publication of any percentage figures very reliable at this time. It is clear, however, that the government's problem is a practical one — in terms of actual tons needed of aluminum, tungsten, nickel, copper, etc.

Thus, if the priority treatment sought by the industry would place less than half of the industry's total requirements under preferential rating, that would earmark so many *less* tons of needed materials, as compared with the situation that would result if the committee's proposal amounted to putting as much as 60 per cent or 70 per cent of the industry's total requirements under a

## Priority, Military Officials Sympathetic to Industry's Needs

In an interview on July 21, with Louis Pitcher, executive vice-president, United States Independent Telephone Association, who had just returned from Washington—where conferences were had between the National Defense Coordinating Committee of the association and OPM and OPACS (see page 13)—TELEPHONY learns that the reception given the committee was most cordial on the part of both of these departmental organizations as well as at conferences with Chairman James L. Fly of the FCC; Maj. Gen. J. O. Mauborgne, Chief Signal Officer of the United States Army, and Maj. Gen. L. D. Gasser of the committee on Aircraft Warning Service, of which Mayor LaGuardia of New York is chairman.

The sympathetic understanding of the problems of the Independent telephone industry by the governmental authorities visited at Washington indicates that a consideration will be given to granting a preferred priority status to the entire telephone industry in the securing of materials necessary for maintenance and repair for switchboard needs of all kinds and for the increase of toll line facilities, Mr. Pitcher stated.

The government, particularly the Army, wants no breakdown in the character of the telephone service furnished the American public, recognizing the fact that the heavy burden of traffic now being placed upon operating companies is largely due to the national defense program, Mr. Pitcher said.

high priority rating. In other words, principles and formulas are all very well as far as they go, but the government has to keep its eyes on actual tonnage.

* * *

On the basis of these conferences, it did not appear likely, that OPACS and OPM would make any immediate modification in their public service industry's preferential order as a result of the USITA committee conference. If any action is taken along this line, it will probably have to await special supplemental procedure.

There are a number of problems that will have to be worked out: The matter of classifying subscribers, if worse comes to worse, is bound to be a ticklish subject. It would be obviously dangerous for the telephone company itself to attempt to draw any distinction between rendering service to: (1) a grocery store, (2) a rolling mill, (3) a hairdressing establishment, (4) an opera singer.

And while it is hoped that the proposed priority in favor of long distance service, as distinguished from local service, will avoid even the ultimate possibility of a breakdown in the present high standard of toll service, it is important to remember that the Communications Act, as now written, gives the government priority rights as to traffic over telephone and telegraph lines in case of war.

Obviously, trying to give government messages the right of way over toll circuits—if we have to come to that—is not going to be an easy matter to solve. Clearly, the mere supervision of the location of the telephone instrument would not be sufficient. A long-distance call by an official like William Knudsen from the golf course of a country club might be far more important than a social call from some second lieutenant stationed at a general Army headquarters. Working out code numbers is one possibility. But those troubles are somewhat in the future.

Some idea of the rapid increase in long distance telephone calls from Washington and its environs can be seen in the following comparison: In the spring of 1940, there were 11,500 long distance calls a day; on Christmas of 1940, there were 19,000 calls; as of July 18, 1941, there were 22,000 calls.

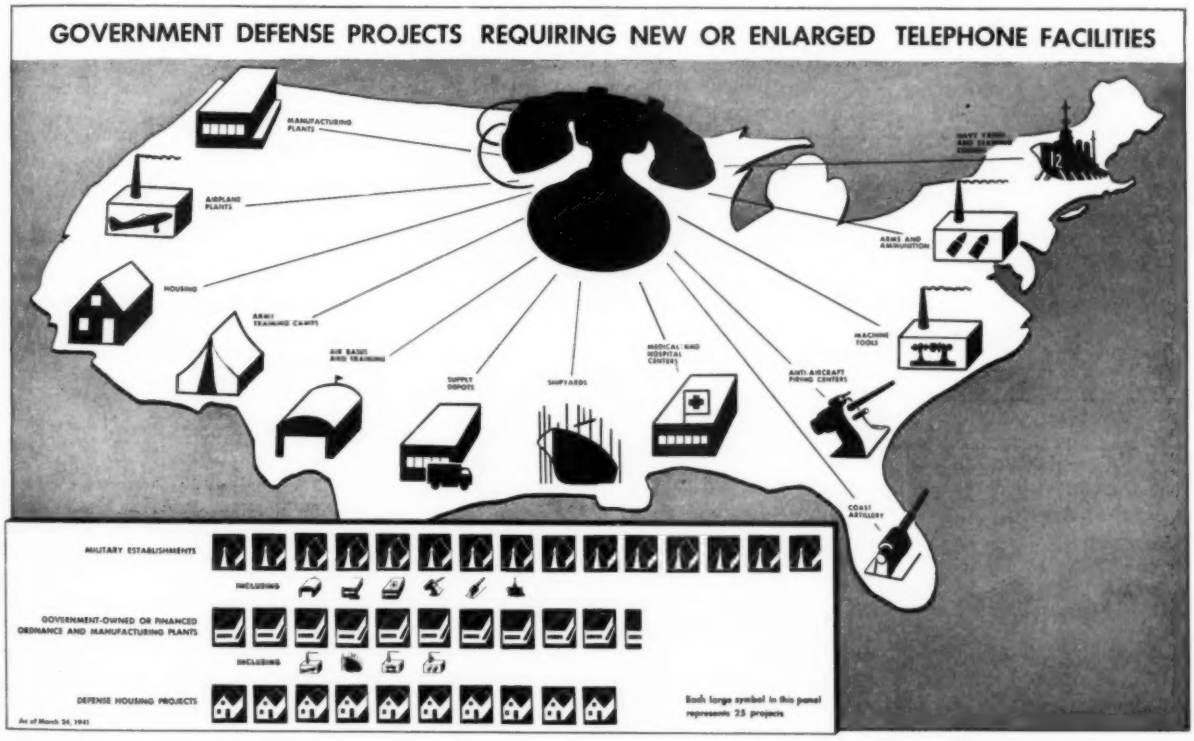
The increasing volume on the Washington central exchange board is also reflected in the following paragraphs which recently appeared in the *Washington Daily News*:

"Local calls have risen 400,000 a day in recent months to an incredible daily total of more than 1,800,000. Figuring each, that means that between us we spend about five years a day on the telephone.

"A little matter of 100,000 miles of wire (many wires to the cable, of course) were put in service between January 1 and May 15. That adds up to 250 trips to Boston and back. Last year it was only 40,000. All in all, construction work and new equipment this year will amount to $15,000,000—twice the cost of all company equipment in 1917.

"The government alone uses 58,500

*(Please turn to page 29)*




This illustration was one of many used in a very attractive and interesting 48-page magazine entitled, "ALL OUT for Defense," published recently by the American Telephone & Telegraph Co. and associated companies. The magazine cover was appropriately printed in red, white and blue colors. Especially designed to depict the nation's defense effort and the importance of telephone communication in achieving this effort, the magazine is beautifully illustrated with photographs. Attention is directed to defense activities of various branches of the United States government for the defense, welfare and protection of this country—the Army, the Navy, the Air Corps—as well as to underlying forces of such effort—the people, who are working to build up this country's defenses. It is pointed out that the telephone works night and day to help builders build arsenals, factories, and ordnance plants. Pictures show that the farmers are providing food for the country's needs. In fact, the use of the telephone from coast to coast is depicted in photographs throughout this magazine.



XUM

By HARRY CHAPMAN

# *Elements* OF THE TELEPHONE

**This sixth article of a series, covering the construction and functions of various parts of a telephone, discusses the operating principles of the receiver. Part V, published in the June 21 issue, dealt with telephone transmitters.**

A TELEPHONE receiver converts electrical energy into sound waves. Everyone is familiar with the construction of the telephone receiver in general use, but are we entirely familiar with its operation and what is required to provide maximum performance? Small details are often overlooked which may seriously affect good service.

There are many men in the telephone field today who have not thoroughly familiarized themselves with the functions of the various parts of a receiver. For example, it is sometimes thought that the permanent magnet merely strengthens the pull exerted by the incoming voice current. That is true enough in one sense of the word, but is not actually the principal function of the permanent magnet.

In our study of the receiver, we can perhaps get a better understanding of its action by comparing it with one using merely a soft iron core. By referring to *Fig. 1*, we see that the diaphragm of the receiver with the soft iron core, at A, lies in a perfectly flat plane, across the poles of the electromagnet, as shown by the solid line. This type of receiver depends entirely upon the incoming voice current to actuate the diaphragm. The illustration in *Fig. 2* of the permanent magnet receiver shows that the diaphragm is somewhat concaved, due to the pull of the permanent magnet. This also is shown by the solid line.

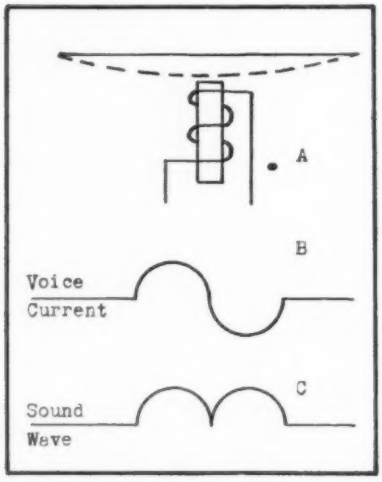



Fig. 1. Diagram of a simple receiver using a soft iron core. Shown also is a graph of the voice current and corresponding sound.

In our study of induction coils we learned that the output current of the secondary of an induction coil is an alternating current and is generally referred to as "voice current." When the voice current E of *Fig. 2* passes through the electromagnet there is set up a magnetomotive force which will assist the pull of the permanent magnet upon the diaphragm, causing the diaphragm to take a much more pronounced concave position as shown in *Fig. 2* by the dotted lines G. As the current reverses its direction there is set up in the electromagnet a force in opposition to that of the permanent magnet (see the first article in this series on magnetism, TELEPHONY, November 23, 1940), which will nullify the pull of the magnets upon the diaphragm, thus permitting it to take a more normal position as shown by the dotted line H.

This assisting and bucking action produced by the voice current in the electromagnet causes the diaphragm to be set in motion. This motion is governed by the voice current set up by the transmitter. The sound produced by the receiver will be identical to that entering the transmitter and we thus have a means of transmitting speech over a great distance by the use of electricity.

In the non-polarized receiver, the full benefit of the alternating current cannot be obtained because we have only one means of creating a pull on the diaphragm—the force set up by the voice current. Due to the non-polarity of such a receiver, the sound produced by it would be only "one-half wave," in respect to the motion of the diaphragm, *Fig. 1-C*. It can readily be seen that this type of receiver on long subscriber loops would be very inefficient. The only place where it would prove satis-

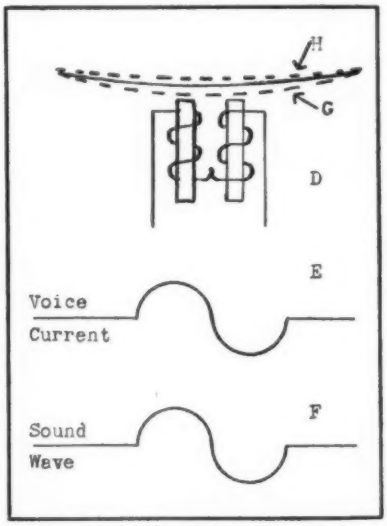



Fig. 2. A permanent magnet receiver, showing the voice current and the corresponding sound wave produced by the receiver.

factory is on very short loops or on intercommunicating systems.

There are numerous factors that determine the efficiency of a receiver. One which is of great importance, but which is given very little consideration, is the thickness of the diaphragm. In the old days, diaphragms of the same manufacture varied in thickness from .0015 to .0025 of an inch. A thin diaphragm is more pliable and responds more freely to voice currents than does a thicker one. Thus, a thin diaphragm provides a more sensitive instrument. Many times merely changing from a thick diaphragm to a thin one will give us the desired results and correct some "can't hear" complaints.

The thickness of the diaphragm can be obtained by the use of a cheap micrometer, which for our purpose can be purchased at a ten-cent store or from a mail order house. Since we use this tool only as a means of comparing the thicknesses of different diaphragms, it need not be highly accurate.

It must be remembered that the air gap between the diaphragm and the poles of the receiver must be a certain dimension. A chart of air gaps used by the different manufacturers is given in *Fig. 4*, which shows a gauge in use. These gauges have two dimensions: one for maximum permissible air gap and one for minimum permissible air gap. The gauge makes it much easier to obtain the proper adjustment. If the poles are not square with the diaphragm, the proper air gap cannot be obtained and the efficiency of the receiver is impaired.

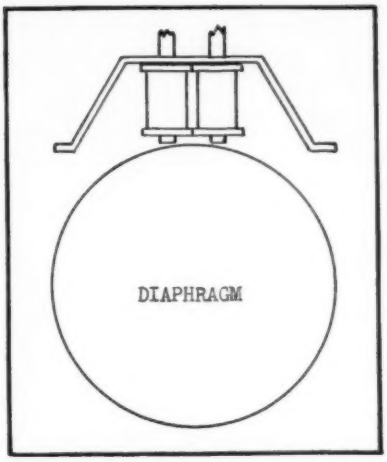


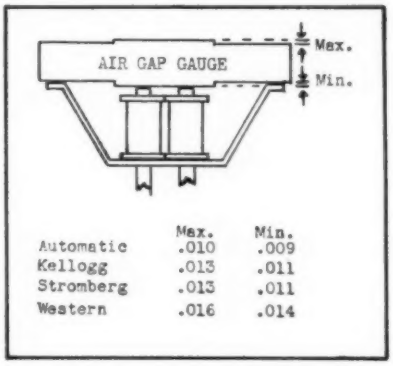

Fig. 3. A simple test to determine whether the magnets of a receiver are sufficiently strong for efficient operation.

In some cases, the poles cannot be moved back from the face to give more gap and must be filed off to the proper depth. A special file must be obtained for this purpose and extreme care exercised to insure the removal of all the "filings." Should filings cling to the ends of the poles and become lodged between the poles and the diaphragm, they would prevent the diaphragm from vibrating freely; and they might strike the diaphragm and cause distortion.

If the air gap is too large and the poles cannot be moved up closer, the face of the receiver bell can be ground down with emery or sand paper. Fasten the sand paper on a board and with a circular motion work the face down to the proper depth. Too large an air gap will result in a weak receiver.

Many times the diaphragm becomes permanently "dished" or concave because of long exposure to the magnetic pull, causing it to rest against the end of the poles. This can be temporarily remedied by turning it over or by cutting a ring out of paper about the thickness of a calling card and placing it between the diaphragm and the receiver bell. This should not be considered a permanent repair job, however.

Another factor which often contributes to poor reception is weak magnets. Although it is difficult to advance any definite formula for determining the strength of the magnets, many maintenance men assume that if the magnets are strong enough to suspend the weight of the diaphragm as illustrated in *Fig. 3*, they are sufficiently strong for satisfactory reception of speech.




| | Max. | Min. |
|---|---|---|
| Automatic | .010 | .009 |
| Kellogg | .013 | .011 |
| Stromberg | .013 | .011 |
| Western | .016 | .014 |

Fig. 4. How the air gap gauge is used. Dimensions of air gaps used by different manufacturers are also given.

Let us now set up a schematic circuit or circuits combining the features we have studied. At A in *Fig. 5*, we have the transmitter, battery and primary of the induction coil at the left of the illustration while at the right we have the secondary and the receiver. Although the battery is shown connected to the transmitter and primary and current is flowing, because of the fact that no sound is striking the diaphragm there is only a steady flow of current through the primary. There is no induced current set up in the secondary and the diaphragm of the receiver remains in its natural, slightly concaved position.

At B, the transmitter has been actuated by sound, causing the diaphragm to be depressed. This causes also a change in current flow through the primary. We learned earlier

*(Please turn to page 33)*

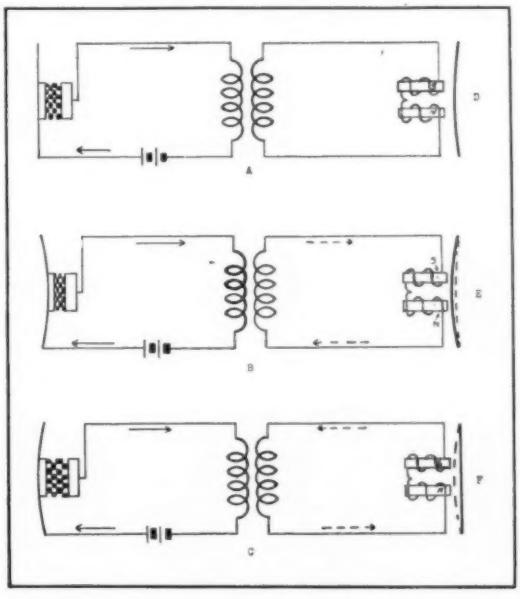



Fig. 5. These three diagrams illustrate the operation of a simple telephone circuit consisting of transmitter, battery, induction coil and receiver.

# The Plant Man's Notebook

By RAY BLAIN
Technical Editor

WE HAVE received a letter from A. S. Hill, assistant traffic dispatcher of the Western Union Telegraph Co., New York City, in which he comments on the arc soldering outfit described in the "kink" on page 15 of the May 17 issue of TELEPHONY and states that this is a helpful gadget which should be well received in all telephone and telegraph plants.

It is true, as Mr. Hill points out, that this is not an arc set at all, but that best results are obtained when two carbon electrodes are pressed firmly against the object to be heated. It is not the arc, but the high $I^2R$ value at the points of contact similar to a spot welder that produces the heat which does a good soldering job.

* * *

An inspection of a new telephone type fire reporting system recently proved extremely interesting. Each line is supervised so that should an open or ground occur a special alarm will sound. A lamp type annunciator associated with the switchboard remains operated after the connection is taken down from the switchboard and until manually released at the annunciator. Iron cased weatherproof telephones mounted on poles serve as reporting stations. No doubt systems similar to this will provide a source of additional revenue for many Independent telephone companies.

* * *

The accompanying photographs sent us by Charles F. Robinson, Signal Corps Telephone Engineer on duty with the Fourth Corps Area, Atlanta, Ga., indicate how drop wire is being used in large quantities when telephone service must be provided in a hurry for some national defense projects before permanent cable distribution can be provided.

* * *

We were honored by a visit from Carl A. Kraege, vice president and manager, McKrae Telephone Co., Burlington, Kans., while he was in Washington in connection with national defense matters. Mr. Kraege was being escorted around by Clyde Bailey and a better guide could not be desired by anyone who wishes to reach important points in the national capital in a hurry.

* * *

Key type telephone systems which permit subscribers access to more than one telephone line are rapidly gaining in popularity by the public. These systems include such features as picking up a number of central office, PBX, or inter-office lines, holding one line while using another, cutting off extension stations or ringers or signaling on intercommunication lines. In fact, this system gives full PBX service without the expense of an operator.

* * *

Had a letter from my old friend, Lieut. Don C. Benjamin, post signal officer at Barksdale Field, La. Don states that it surely keeps him on the jump expanding the telephone system at that field in order to provide communication for our constantly growing Army.

* * *

Maj. Walter Topping, Signal Corps, from the traffic department of the New York Telephone Co. is now on active duty in the plant and traffic division, Office of the Chief Signal Officer, U. S. Army, Washington, D. C.

---

USE OF LOAD COILS: The average Independent telephone company may not realize fully the many advantages in using load coils on exchange cable. Generally, when improved transmission is required on extra long cable lines, 22-gauge or smaller conductors are replaced with at least 19-gauge cable.

Probably as good or better transmission could be obtained by the installation of load coils which would cost much less than the cable replacement. Manufacturers of load coils will be glad to give you accurate information on all problems of this nature.

*(Please turn to page 25)*



XUM

# *Quality*-clear through

WHEN you buy Cook XB Cable Terminals whether in the specially designed and constructed 6 pair size or in the larger 11, 16 or 26 pair sizes, you get quality clear through . . . quality that means economy in time and labor at installation and economy in maintenance through long years of service. Buy Cook XB Cable Terminals from all telephone equipment manufacturers and supply houses. Cook XB features are covered by Letters Patent Numbers 1,716,531, 1,660,815, and 2,078,991. Other patents pending.

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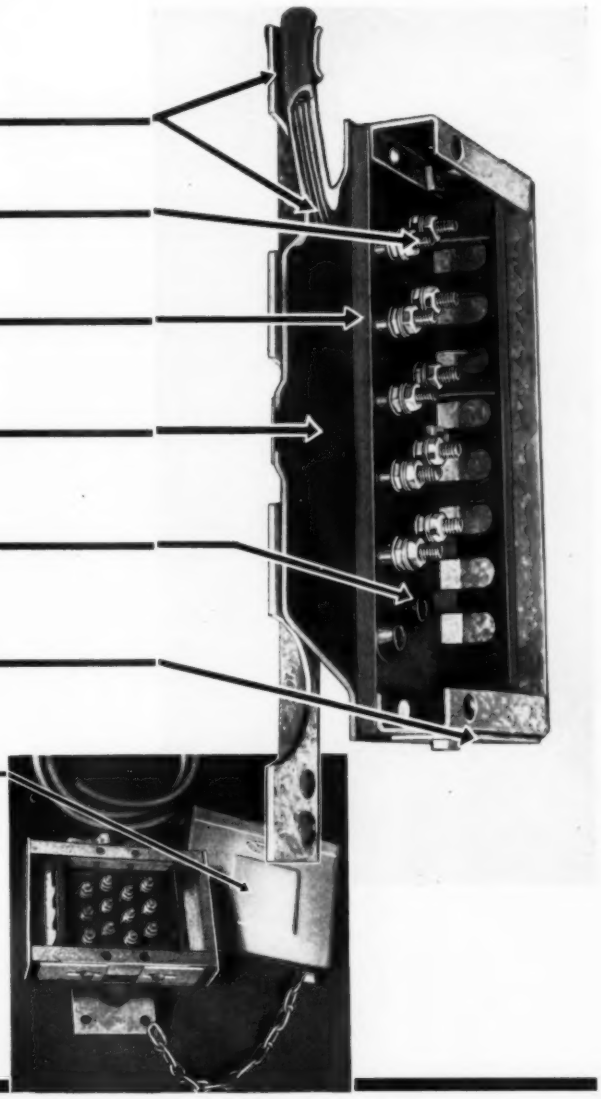
FEATURE NO. 3 — Patented Bakelite face plate and insulating fanning strip molded in one piece.

FEATURE NO. 4 — Compound filling accomplished by an exclusive process that insures against shorts and grounds by permanently positioning the cable pairs.

FEATURE NO. 5—Raised stud mountings that eliminate surface leakage and provide an extra measure of protection against shorts.

FEATURE NO. 6 — Patented weather guards that exclude snow, rain, dirt and insects at the drop wire openings.

FEATURE NO. 7—Heavy reversible zinc hood that permits mounting with stub from either top or bottom. Furnished either with or without cable stub.



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# AUTOMATIC OLL

## for remote co toll

The Automatic Toll Board installations shown he actuat represent telephone history in the making. Th Switch exemplify the great forward stride being tak room, by the telephone industry in toll switching practic mecha —wherein automatic switches or relays relieve th calls p operator of the physical drudgery and burden o fatigu her task. service

These installations are the vanguard of a new an Before advanced method of toll operation. Just as th sure t Strowger Automatic Switch revolutionized loca Toll Bo exchange operation, so is this cordless, plugle condit and jackless board now revolutionizing long di explain tance switching. Seated comfortably at a des us dire of ordinary height, the operator has merely t

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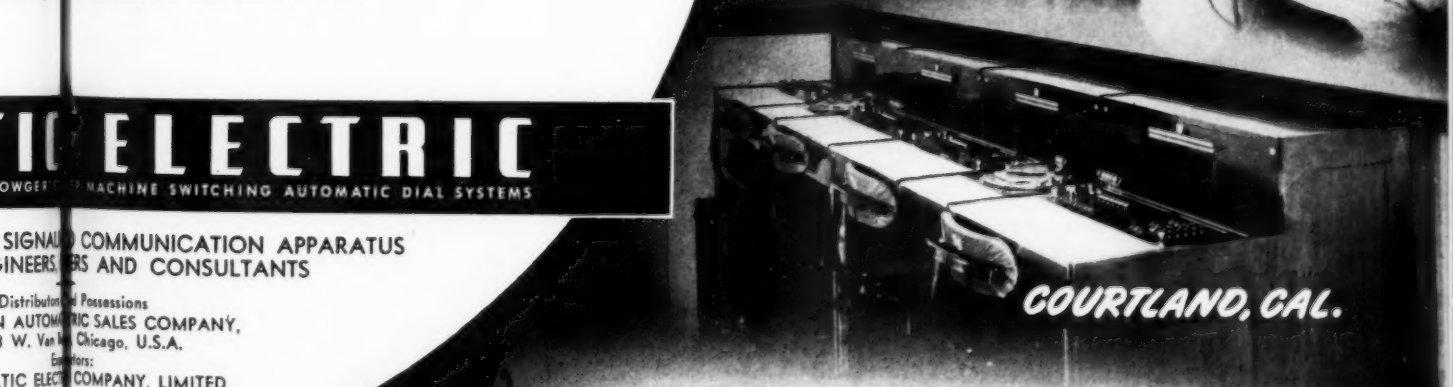
Before buying a new toll board of any kind, be sure to investigate thoroughly the Automatic Toll Board as applied specifically to your particular conditions. Our representative will be glad to explain its features in detail, or if you prefer, write us direct for full information.

TAMPA, FLA.



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# NEWS of the Industry

## Five "Telephone Students" Graduated in Iowa

Jessie M. Parker, superintendent of public instruction in Iowa, has reported that five "telephone seniors" were graduated from Iowa high schools this year. The physically - handicapped graduates, all of whom had classrooms brought to them over leased wires daily, are: Merrill Steele, Cherokee; Harold Morton, Estherville; Jerry Carpenter, Pella; and Hubert Loveridge and Darwin Senter, both of Newton.

"In each instance," Miss Parker said, "graduation has been achieved because a courageous young man has refused to be defeated."

The public instruction department pioneered the use of two-way communication devices for such teaching of pupils unable to attend classes regularly (TELEPHONY, April 5, page 24).

## Songs Mentioning Telephone Form Hobby Collection

That the telephone, with its untold advantages and services rendered to humanity throughout the world, has extended beyond that field is revealed in a recent display at the offices of the Ohio Bell Telephone Co. in Columbus. The display consists of sheet music in which the telephone is mentioned.

This display demonstrates that the telephone has proved a great inspiration to song writers and is taken from the collection of songs, based on this modern invention, which has been assembled during the past six years by Clarence A. Swoyer of 1497 S. Fourth street, Columbus, of the telephone company's plant department.

The telephone song display, pictured in the accompanying illustration, will be shown by the Ohio Bell in the following towns during the next year or so: Cleveland, Toledo, Dayton, Akron, Youngstown, Upper Sandusky, Middletown, Xenia, Washington Court House, Lancaster, Coshocton, Bridgeport and Alliance.

Mr. Swoyer started the collection of telephone song titles as a hobby and to date has collected a list of 650, all of which are based in some manner on the telephone or its numerous operations. Not only has he listed this number of titles, but 430 of the songs are in his possession in the form of sheet music—and he's still searching.

In gathering this valuable collection more than 100,000 pieces of sheet music were handled, as well as a vast amount of historical data compiled. Mr. Swoyer believes that many more songs will be dedicated to the telephone as he contends no other invention has proven such an inspiration to song writers.

Among the many musical numbers to be found in the collection is one that dates back to 1877 to the publication of "Telephone March" by E. Mack. It is claimed to be the first piece of music ever dedicated to the telephone and was published the year following the telephone's invention. Other compositions on down through the years from that period, including several composed in 1940, are also to be found in the list. In 1938 alone more than 30 "telephone" songs were copyrighted.

"All Alone" is the title of one of the more popular songs a few years ago. Some writers have used the telephone theme repeatedly. Irving Berlin,

OHIO BELL MAN COLLECTS
430 SONGS WHICH FEATURE
OR MENTION THE TELEPHONE
ALL ALONE
TOMORROW
HELLO CENTRAL
DADDY COME HOME
HELLO AMERICA HELLO
THE TELEPHONE GIRL
ALWAYS READY
Mr. C.A. Swoyer, Ohio Bell plant man at Columbus, and chairman of the Historical Committee of N.C. Kingsbury Chapter No.7 of the Telephone Pioneers, has collected these 430 songs and he still searches for others.
Thirty copyrighted selections were found for 1938 alone. 1939 and 1940 carried on with a number of new songs. Mr. Swoyer wonders what new numbers 1941 will add to his collection.
C.A. SWOYER
1939

Traveling display being exhibited in Ohio Bell Telephone Co. show windows during 1941 and 1942, which makes use of some of the "telephone songs" from a historical collection of 430 pieces of sheet music owned by C. A. SWOYER (inset), a telephone man in Columbus.

for example, has written at least a dozen, from "Call Me Up Some Rainy Afternoon" (1910) to "You Can't Brush Me Off" (1940).

There are a number of "Hello—" songs, such as "Hello Frisco" and "Hello Montreal" and several on World War subjects.

The owner of this vast array of telephone songs—probably the only one of its kind in existence—is so enthusiastic over his hobby that he believes telephone-television will prove a still greater inspiration to song writers. Mr. Swoyer has even gone so far as to suggest a title for the first song to be dedicated to that invention, "I See Your Phoney Face Before Me."

Mr. Swoyer is chairman of the historical committee of N. C. Kingsbury Chapter No. 2 of the Telephone Pioneers of America. Since last fall stories concerning his telephone-sheet music collection have appeared in many Bell magazines and in newspapers.

▼ ▼

### Telephones Made in 1877 On Display in Museum

One of the new exhibits to be placed in the telephone museum in Cleveland, Ohio, is a telephone of the type in use back in 1877. It is one of a pair of old telephones which have been presented by V. Glenn Smith, cashier in the Franklin county (Ohio) clerk's office, to the Telephone Pioneers of America. The instruments have been turned over to Carl F. Heer, chairman of the historical committee of the organization.

Mr. Smith secured the telephones from his grandfather 40 years ago. Similar instruments were used at one time to connect the Franklin county court house and a Columbus business firm located a half-mile away. A mechanism is provided for jerking a string to tap the bell. There is also an arrangement for extending the transmitting diaphragm to tighten the string.

▼ ▼

### New Device Lists Weather, Time, and Telephones

One of Chicago's landmarks was displaced May 1 when a modern contrivance showing the number of telephones in the city replaced the big bell-shaped sign in the telephone building at 230 W. Washington street. For 28 years the "Blue Bell" with its electrically lighted numerals has been showing the fluctuations in telephones. In the course of a month it was heard of by hundreds of thousands when others said, "Business must be good (or bad) because I noticed the 'Blue Bell' has been showing an increase

The efficiency of line construction and maintenance work, whether it be overhead or underground, necessarily depends a great deal upon the quality and design of the tools which are used. GRAYBAR'S long years of experience in meeting the tool needs of independent telephone companies, make it the logical source of specific tools for specific jobs. For, the tools which you buy from GRAYBAR have not only been designed for the job, but have also been pre-tested under actual field conditions.

Put your needs up to a GRAYBAR specialist. He's had long acquaintance with the experience of other users and can give you competent advice on your choice of equipment. GRAYBAR has more than 80 warehouses in principal cities throughout the country. Why not consider the nearest as one of your own? Whether you need a line construction truck or a roll of tape, you'll receive the same prompt, cooperative service.

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**This magneto test unit is indispensable for keeping lines up to peak performance.** It aids in minimizing subscriber complaints by enabling corrective measures to be taken at once. In addition, you can use it for testing telephones, ringers, generators, and other similar parts.

The set contains five lever keys and one especially designed Weston voltmeter which has two scales (0-6 and 0-150) and a special scales showing resistance in ohms. Write for prices and details.

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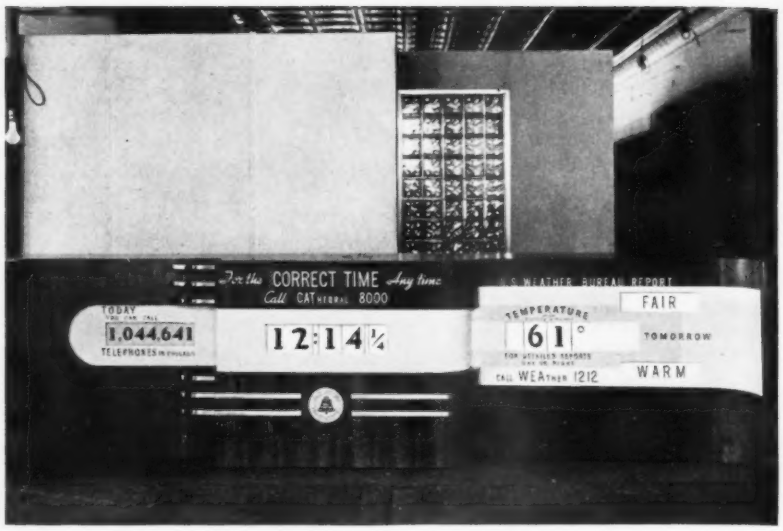


The number of telephones in Chicago, correct time and the weather report form this interesting sign of the Illinois Bell Telephone Co. at 230 W. Washington St., Chicago.

(or decrease) in the number of telephones."

The new device, believed to be the only one of its kind in the country, shows not only the number of telephones but also the correct time and the weather report. The number of telephones is posted daily. The time of day is changed every quarter minute, and the temperature reports hourly. The forecast for tomorrow is altered as needed—often several times a day.

▼ ▼

## Issues Comprehensive Study of Ohio Companies

One of the most comprehensive surveys ever made of Ohio Independent telephone companies has been completed and is set forth in a report which has been issued by Frank L. McKinney, executive secretary of the Ohio Independent Telephone Association.

This report, which has been compiled to provide military and civil authorities with information relating to the wide scope of Independent telephone services and facilities, shows that there are 693 Independent telephone exchanges in the state.

It is further shown that more than 82 per cent of the total area of Ohio is covered exclusively by Independent telephone companies, which are serving 319,000 stations, not including those of the Cincinnati & Suburban Bell Telephone Co.

The number of originating messages of all kinds handled by Independent companies in the state during 1940, according to the report, was 698,611,000, while the number of sent paid and received collect toll calls handled during that year was 6,261,518.

It is further set forth in the report that 4,785,000 local toll messages were originated by and handled over Independent facilities, while the number of local messages completed by Independent companies in 1940 was 678,563,482. It is also pointed out that 6,317,000 toll calls were received paid from the Bell System.

▼ ▼

## Demonstration Given on Telephone Personality

About 150 executives of Brooklyn and Queens (New York City) business concerns were guests of the Long Island branch of the New York Telephone Co., at a recent luncheon and show designed to illustrate "the power of a pleasant telephone personality."

The show, a series of skits dramatizing "the do's and don'ts" in telephone conversations, was staged by employes of the company in the auditorium of its main Brooklyn building. A. G. Wright, vice president and general manager, welcomed the guests, among whom were District Attorney O'Dwyer and Borough President Harvey of Queens.

Characters portrayed, such as switchboard girls who answer the telephone with an unintelligible mumble supposed to be the name of the firm, brought roars of laughter from the guests, who appeared to have had experiences of similar situations.

The moral of the show, as expressed by Mr. Wright, was that "courteous telephone usage can be made to pay better business dividends."

# Saving Disconnects Important As Getting New Subscribers

**By EARLE BLOMEYER**

DO YOU know how rapid and costly your turnover of telephone subscribers is? Most managers will probably be surprised if they will stop and count the connects and disconnects for the past year, and see what a large percentage of the total stations in service at their exchanges is changed every year.

For example, I have been able to obtain these figures for the year of 1940 from two average Independent companies:

| | Stations Installed | Stations Disconnected |
|---|---|---|
| Company A (3,170 sta.) | 973 | 846 |
| Company B (1,040 sta.) | 334 | 255 |

It will be noticed that in each case, the stations removed during the year amounted to about 25 per cent of the total number of stations in service. During the year, one-fourth of all of the stations were changed or removed.

Each of these companies installed more than it removed, and thus had a gain during the year, but think how much better the gain would have been if some of those disconnects could have been saved; if some of those subscribers could have been convinced that they should have kept their telephones.

Naturally, there is a large number of disconnects that cannot be saved, such as those occasioned by subscribers moving away from town, suspensions for non-payment, and others. But there are also many disconnects that can be saved if some effort is made to resell to the subscriber the value of his telephone. These subscribers usually claim they cannot afford a telephone, or just say they do not need it.

Of course, many of these customers actually cannot afford telephone service, but these are the people upon whom effort should be made to resell the service, because *it is much better to save a disconnect than it is to go out and sell a new install.*

With a present subscriber, you already have a lot of valuable information, such as his credit rating, which is not always available for a new subscriber. A present subscriber already has his telephone installed and working, while the installation of a new telephone involves quite a bit of expense. Also, a present subscriber is already listed in the directory, and his number is probably known by his friends, so that he does not impose the additional load upon the operators and information board that a new subscriber does.

Thus, it is easily seen that if a few disconnects can be saved by spending some time upon those doubtful cases, time and effort will be better spent than it would be in gaining the same number of new subscribers.

Whenever the commercial office takes a disconnect order, it should be sure to get the reason for the disconnect. With this information, those subscribers upon whom it would be worthwhile to spend time and effort in an attempt to resell them can be selected.

Also, this will enable followups in the case of moves to see if potential subscribers are moving into vacant houses.

A high turnover of subscribers is expensive, and if a company can decrease its turnover by even a small amount, it will save a lot of labor and material.

**Best Story of the Week—What's Yours?**

When Mrs. Lloyd Parsons, in her home at Warsaw, Mo., heard the fire siren, she asked the telephone operator the location of the fire. The operator said, "In the Lloyd Parsons home." Her husband, visiting at a neighbor's, had noticed a small fire on the roof of his house and called the fire department before notifying his wife.


**INCREASE YOUR REVENUE with GRAY Pay Stations**

No. 23D

The No. 23D pay station is an effective revenue producer. It is compact and neat in appearance and contains the necessary hook switch springs and connections. A separate lock allows access to the mechanism for inspection or repair without unlocking the cash drawer. The universal mounting plate permits either wall or shelf mounting.

When ordering, please specify the type of transmitter to be used so that the proper mountings will be supplied. If desired, we will furnish this pay station complete with any specified transmitter and receiver at catalog prices plus 50c for installation.

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# A Lineman Tells His "Grunt" About KLEIN'S

*"Since 1857"*

IT'S quality, not luck—not habit—that has put Klein pliers in the hands of linemen and electricians everywhere. The kid starting on line work learns of Klein quality from the "old-timer," who remembers back when he was a "grunt" and first heard that there were no other pliers like Klein's. This "pass along" advice by men who rate tools on their performance under toughest service is a testimonial to Klein's maintenance of highest quality. Unfailing "since 1857."

*Your copy of the Klein Pocket Tool Guide will be sent on request.*

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## COMING CONVENTIONS

**Three-state joint meeting of Maine, New Hampshire and Vermont Telephone Associations, Mount Washington Hotel, Bretton Woods, N. H., September 9, 10 and 11.**

**Arkansas Telephone Association, Arlington Hotel, Hot Springs, September 22 and 23.**

**Association of American Railroads, Telephone Section, Hotel Gibson, Cincinnati, Ohio, September 23, 24 and 25.**

**South Dakota Telephone Association, Hotel Carpenter, Sioux Falls, October 8 and 9.**

**United States Independent Telephone Association, Hotel Stevens, Chicago, October 14, 15, 16 and 17.**

**Independent Pioneer Telephone Association, Hotel Stevens, Chicago, October 16.**

**Virginia Independent Telephone Association, Hotel Roanoke, Roanoke, October 23 and 24.**

**North Carolina Independent Telephone Association, Pine Needles Inn, Southern Pines, October 27 and 28.**

**South Carolina Independent Telephone Association, November 3 and 4.**

**Florida Telephone Association, New Florida Hotel, Lakeland, November 7 and 8.**

**Alabama Independent Telephone Association, November 13 and 14.**

**Tennessee Independent Telephone Association, Hermitage Hotel, Nashville, November 17 and 18.**

**Kentucky Independent Telephone Association, December 2 and 3.**

## School Children Learn to Use Telephone

A complete telephone exchange built into two suitcases was the novel means used recently by the Creston (Iowa) Mutual Telephone Co. to teach correct telephone usage to students of the Creston public schools, reports Manager George E. Atkinson.

The demonstration set was constructed by plant men of the Creston company during their spare time. One of the suitcases contains a miniature switchboard, while the second one is used to carry two desk telephones and 75 feet of cord for connections.

In the classroom, the teacher acts as operator. She makes connections and rings the students or numbers called. At the same time instruction is given on the correct use of the telephone, with emphasis placed on having the correct number, talking directly into the mouthpiece, cultivating a good voice, and being courteous to the operator and the called party.

In addition to the demonstration telephones, the Creston Mutual company furnished the classes with directories, and students were given practice in looking up numbers quickly and accurately.

Mr. Atkinson reports that the unusual demonstration idea "went over big" with both students and teachers, and suggests that other companies may wish to try a similar plan in their communities.

## Blind Women Operate New Switchboard

A Braille telephone switchboard for blind operators has been developed by the Bell Telephone Co. of Pennsylvania, and installed at the Pennsylvania Institution for the Blind at Overbrook.

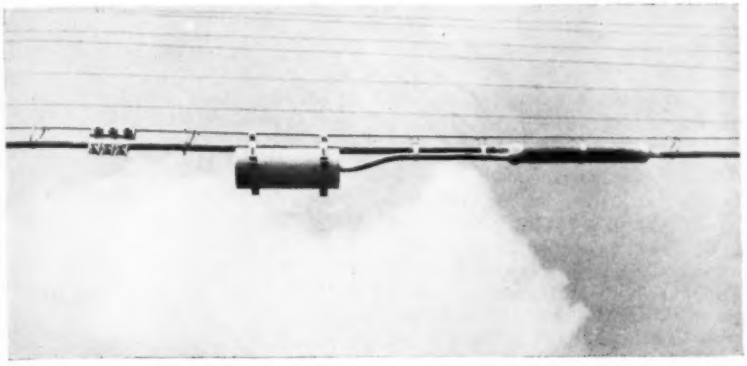
The switchboard, instead of having lights to guide the operator, is arranged so that when a call comes in a buzzer signals the operator and a plunger on the line is elevated one-eighth of an inch.

Trained fingers find the "up" plunger and another jack is located by Braille characters. Another buzzer sounds when a conversation is finished.

Three young women at the school have been trained to operate the board and classes have been started in switchboard operation. The board controls telephones in various offices and at six dormitory cottages.

## The Plant Man's Notebook

*(Concluded from page 16)*



A modern load coil installation of the strand mounting type.

The accompanying photograph shows a modern load coil installation of the strand mounting type. Note the use of the special strap type support for the cable splice and the grade clamp near the load coil. This is an ideal type of installation for smaller-sized cables.

●

NIGHT PAY STATIONS: Many of us are familiar with the fact that it is difficult to locate a pay station late at night in certain sections of various cities. During the day pay stations are easily located in drug stores or other places of business but late at night about the only place one can be found is in a hotel, and they are generally not numerous.

In Washington, D. C., a telephone booth is located on the corner of an all-night parking lot and we understand it does a very good business. Similar installations should be encouraged not only in parking lots but filling stations and similar locations as well. Some progressive manufacturer might even develop a pay station booth suitable for outside use.

A rushing business is done by this outdoor telephone booth in Washington, D. C., conveniently located near an all-night parking lot.

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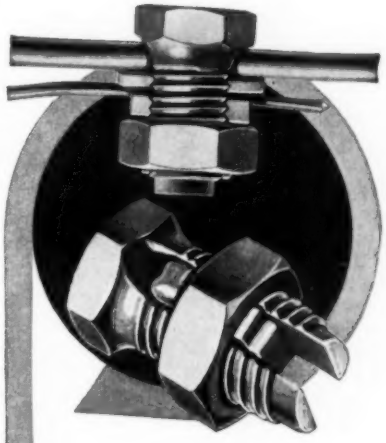
BRIDGING
CONNECTORS



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- Equally efficient on repeated re-use

A most *reliable* means of making solderless tap connections for telephone, telegraph and signal lines. These connectors have a large margin of strength over actual field requirements and cannot be distorted with a standard telephone socket wrench. You are assured a superior connection with considerable saving in time and lower costs. Request a test sample.

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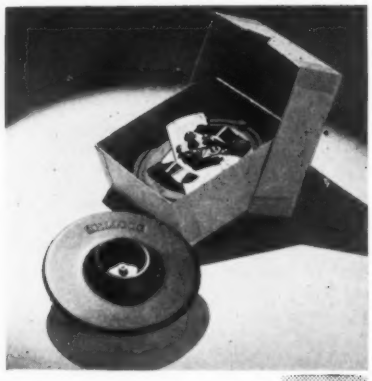

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Run down transmitters can't get by nowadays. People expect more of their telephone than they did ten years ago.

Send your poor transmitters in to Suttle for remanufacturing service. Our recharging standards today are much more efficient than the original manufacturing standards of fifteen years ago. The metal parts are the same, but the carbon used today permits finer adjustments with a more faithful transmission.

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**EQUIPMENT CO.**
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# Commissions and Courts

## Court Approves Pacific Bell Rate Increases

A decision directing the Washington Public Service Department to grant rate increases to the Pacific Telephone & Telegraph Co. was handed down July 19 by Superior Court Judge D. F. Wright, of Olympia. Judge Wright's ruling was in the rate case in which, after a year-and-a-half investigation costing $200,000, the department had denied the company's request for $1,000,000 rate increases on telephone service. Judge Wright directed the department to make widespread revisions of its findings on which it based an order denying the boost and directing a rate reduction of a similar amount.

In only one instance did Judge Wright uphold the department's findings. He affirmed its ruling permitting the telephone company to add to its customers' monthly bills the business and occupational taxes levied on it by the cities of Olympia, Port Angeles, Seattle, Centralia, Shelton, Bellingham, Dayton and Spokane.

Judge Wright directed the department to permit a state-wide increase in telephone rates so that the company could earn 6 per cent profit on a revised rate-making base instead of the 5.5 per cent profit on the smaller base fixed by the department.

The memorandum opinion stated that such items as retirement fund for old employes and "research fees" paid to the parent company, American Telephone & Telegraph Co., should be included in the rate base and charged to the customers.

Judge Wright also directed that property held for future use by the telephone company should be included and the cost to reproduce, less depreciation, should be used by the department in figuring a rate base.

"Depreciation for rate base should be determined by physical examination, in so far as practicable. Possible causes of retirement such as inadequacy, obsolescence, changes in the art, requirements of public authorities should be considered," the opinion said.

"The department, using this rule, should allow such an increase in the consumers' rates as will pay a return of not less than 6 per cent on the base so determined."

The department's order directing a rate cut was based on voluminous findings obtained after 18 months of hearings in all parts of the state where the Pacific Telephone & Telegraph Co. operates. The inquiry was launched after the 1939 legislature appropriated $300,000 for the job.

▼ ▼

## Summary of Commission Hearings and Rulings

***Federal Communications Commission***

July 3: Granted authority to New Jersey Bell Telephone Co. and American Telephone & Telegraph Co. to supplement existing facilities between Tuckerton and Pleasantville, N. J.

July 3: Cincinnati & Suburban Bell Telephone Co. granted authority to supplement existing facilities between Hamilton and College Corner, Ohio.

July 9: Granted authority to Southern Bell Telephone & Telegraph Co. to supplement existing facilities between Charlotte, N. C. and Darlington, S. C., and between Robin's Neck and Bennettsville, S. C.

July 9: Southern California Telephone Co. given authority to supplement existing facilities between Danby and Yermo, Calif., by constructing open wire for about 101 miles and an 88-mile pole line; the total estimated cost is about $203,000, of which $22,000 will be expended for carrier and associated equipment.

July 9: American Telephone & Telegraph Co. granted authority to supplement existing facilities between Denmark, S. C. and Jacksonville, Fla.

July 9: Adopted order denying motion for rehearing in the investigation of the enlargement by the Southwestern Bell Telephone Co. of the Kansas City exchange area (see TELEPHONY, June 14, page 22).

July 10: Informal authority requested by Southern Bell Telephone & Telegraph Co. to supplement existing facilities by constructing between a point 1.5 miles north of the Alabama-Florida state line and Chipley, Fla., two .104 copper wires for a total distance of 17.8 miles.

July 10: Informal authority requested by Southern Bell Telephone & Telegraph Co. to supplement existing facilities between Sulphur and Vinton, La.

July 10: Southwestern Bell Telephone Co. requested informal authority to supplement existing facilities be-

tween Neelyville, Mo., and Corning, Ark.

July 11: American Telephone & Telegraph Co. requested authority to supplement existing facilities between Atlanta, Ga., and Mobile, Ala., and between Flomaton, Ala., and Pensacola, Fla.

July 11: Chesapeake & Potomac Telephone Companies of West Virginia and Baltimore City requested informal authority to supplement their existing facilities by constructing between Berkley Springs, W. Va. and Hancock, Md., two .104 copper wires for a distance of 5.3 miles.

July 16: Granted authority to American Telephone & Telegraph Co. to supplement existing facilities between Harrisburgh, Pa. and Baltimore, Md., by constructing cable for 79 miles and installing carrier equipment thereon; estimated cost is $1,037,000, of which $272,700 will be expended for carrier and associated equipment.

July 16: Dismissed petition filed by Oklahoma-Arkansas Telephone Co. which requested leave to file an additional brief in the matter of Oklahoma-Arkansas Telephone Co. vs. Southwestern Bell Telephone Co.

### *California Railroad Commission*

July 14: Authority granted Mary Davis, doing business under the name of Kernville Telephone Co., to transfer telephone properties at Kernville to Orian F. Campbell. Mr. Campbell was authorized to issue a note for $10,000 and to execute chattel mortgage and real estate mortgage on the properties.

July 16: Associated Telephone Co., Ltd., granted authority to discontinue eight-party residence telephone service in its Pomona exchange coincident with reduction of rate for four-party residence service and coincident with conversion of Pomona exchange to dial operation.

July 18: California Water & Telephone Co. filed petition seeking authority to issue and sell bonds.

### *Illinois Commerce Commission*

July 12: Ordered Illinois Commercial Telephone Co. to restore service to certain lines south from Carterville, discontinued in March because building of Crab Orchard lake required removal of the telephone lines. Federal government has granted permission for a rerouting of the lines, the commission said.

July 23: Hearing at Springfield on application of Eastern Illinois Telephone Co. for an order authorizing the issue of $125,000 par amount of first mortgage 4½ per cent bonds to be dated July 1, 1941, and to mature July 1, 1961.

July 23: Hearing at Springfield on proposed advance in rates for telephone service in Belleville, East St. Louis, Edgemont, Freeburg, Granite City, and New Athens by the Southwestern Bell Telephone Co.

July 24: Hearing at Springfield in the matter of proposed advance in rates for service by the Fayette County Mutual Telephone Co. in Brownstown (Sefton lines), Fayette county.

### *Minnesota Railroad & Warehouse Commission*

July 14: Approved a joint application of Northwestern Bell Telephone Co., Acton Telephone Co. and Empire Telephone Co., under which property of the Acton company in Acton and vicinity, would be sold to the Bell, which would then transfer certain parts of the property thus acquired to the Empire company. The directors of the Acton company voted to sell, because the company was unable to meet the cost of metallicizing, made necessary by paralleling REA lines.

July 14: Tri-State Telephone & Telegraph Co. granted authority to place in effect new and higher rates at its Chatfield exchange. Among the rate changes are the following:

Business individual line, raised from $2.75 to $3.50; business two-party, $2.50 to $3.00. Residence individual line (wall), $1.75 to $2.25; residence two-party, new, $2.00; residence four-party (wall), $1.50 discontinued. Rural business (wall), $1.75 to $2.50; rural residence (wall), $1.75 to $2.00. New rate applies to desk as well as wall sets; old rates were 25 cents higher for desk than for wall sets. Subject to prompt payment discount of 25 cents.

July 17: Postponed until September 15 hearing, originally scheduled for July 23, on application by Northwestern Bell Telephone Co. for approval of a change of rates at Grand Rapids.

### *Nebraska State Railway Commission*

July 18: Authority granted the Lincoln Telephone & Telegraph Co. to cancel from local tariffs in its exchanges at Adams, Brock, Burr, Cook, Milligan, Ong, Pickrell, Shickley, Steinauer, Tobias and Western the rate for two-party residence service, no longer in demand.

July 18: Application of the Bertrand Telephone Co. for validation of an issue of $3,000 of notes was set for hearing September 25.

July 18: Authority granted Lincoln Telephone & Telegraph Co. for revised general exchange tariffs relating to message toll telephone service, effective at once, as emergency was found to exist.

July 18: Permission granted Lincoln Telephone & Telegraph Co. to discontinue supplemental service from its Fairfield exchange and cancel provisions therefor from its tariff. For $1.00 a month extra Fairfield subscribers were given added service to Clay Center, Glenville and Edgar exchanges, and for 25 cents a month rural subscribers were given the same privilege. Evidence showed that only one subscriber was using the service, and she agreed to waive right to continuance.

July 18: Public Telephone Co. of Blair was authorized to issue $40,000 of 3.75 per cent bonds to replace $36,000 now outstanding, bearing a higher rate of interest, 4.5 per cent, than the new issue. Because of market conditions order becomes effective at once.

July 18: Authority granted the Blair Telephone Co. to issue $50,000 of 3.5 per cent bonds to replace a like amount bearing a higher rate of interest, 4 per cent, and as an emergency exists order was made effective immediately.

### *New York Public Service Commission*

July 21: Hearing at New York in proceeding on motion of commission as to certain rates, etc., of New York Telephone Co. in respect to service through private branch exchanges in hotels, apartment houses and clubs.

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TYPE 60A UNPROTECTED CABLE TERMINAL

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July 24: Hearing at Syracuse on applications of Wiltsieville Telephone Co. and South West Oswego Telephone Co. for consent to the transfer of their telephone works and system to the Cato & Meridian Telephone Co., which company joined in the applications.

***Ohio Public Utilities Commission***

July 2: Northern Ohio Telephone Co. has been granted authority to file an increase in rates for Genoa and vicinity, effective when new dial telephones are placed in use.

July 9: Application filed by Ohio Bell Telephone Co. asking for authority to increase from 25 to 50 cents per month the charge for extra directory listings of suburban business subscribers. The increases would affect only 17 subscribers.

July 15: Practically all of the affected subscribers having agreed to the change, authority granted the Ohio Bell Telephone Co. to transfer from its Ravenna exchange to its Kent exchange the territory known as Brady Lake. Under the order of the commission the transfer involves no increase in rates.

July 17: Northern Ohio Telephone Co. authorized to file the following rates for an optional automatic service in its Galion exchange and to change from quarterly to monthly billing for its rural service:

Business independent line, $4.75; business four-party, $4.00; business rural, $3.25. Residence independent, $3.50; residence four-party, residence rural $2.50.

July 17: Approved boundaries of the Mansfield Telephone Co.'s Mansfield exchange and of the newly-created Ontario exchange.

July 17: Approved boundaries of the exchanges of the North East Ohio Telephone Co. to cover the creation of the new Johnston exchange, and authorized the filing of the following rates, which have been agreed to by substantially all of the affected subscribers for the new automatic service in the new exchange:

Business independent, $4.75; business two-party, $4.25; business rural $3.75. Residence independent, $3.00; residence five-party, $2.25; residence rural $2.25.

July 19: Ohio Bell Telephone Co. has been authorized to cancel in its Belpre exchange, business four-party message rate service. No such service has been rendered since 1929.

July 19: Ohio Bell Telephone Co. has been authorized by the utilities commission to delete from its schedules for Bloomingburg, Jeffersonville, New Holland, Milledgeville and Washington exchanges the "no answer service" which was inaugurated on an experimental basis for the period ended June 1, 1941. The usage of the service was so limited as not to warrant its continuance.

July 19: Upon showing the agreement of substantially all affected subscribers, the Ohio Bell Telephone Co. has been authorized to revise its rates in the St. Clairsville exchange when and as it provides free service to the Bellaire, Bethesda, Bridgeport and Martins Ferry exchanges. The proposed changes are:

Business independent, $4.00 to $6.00; business two-party, $3.25 to $5.00; business rural, $3.00 to $3.50. Residence independent, $2.75 to $3.00; residence two-party (new) $2.50; residence rural, $2.00

***Oklahoma Corporation Commission***

July 18: Ordered B. Richardson, telephone engineer, and Paul R. Reed, commission general auditor and rate actuary, to make an inventory and appraisal of the properties of J. R. Butler, in connection with his application for higher rates for the Mill Creek Telephone Co. and the Clarita Telephone Co.

## SING! SING! SING—ANYWAY!


By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines.


THERE is this difference between a talented person and one who is said to be a genius: Talent must be developed through voluntary effort—it depends on close and continuous application to the thing to be done. The power of a genius, on the other hand, comes naturally and it requires no particular application or effort. Genius, it might be said, is a gift.

Even though the genius seems indeed to be gifted, I think we are more interested in a talented person than in a genius because we know a talented person has had to work in order to develop his talent, whereas a genius has had his ability ready made.

A carrier pigeon would not possess its ability to fly home unerringly if having it depended on itself. Just so it is with a genius or remarkable instinct except in very rare cases.

Neither geniuses nor talented people are the only ones who count in this world, however. They are the few among many. After all, we who belong to the great majority—the ones who are not either geniuses or talented in an outstanding way—will do more good in the world if we remain what nature intended us to be rather than trying to do something in which we cannot hope to succeed—something that is beyond our depth. We are wise to recognize our limitations.

I am reminded of the operator who wrote me a letter which, I think, was to unburden her disappointment in not being selected for the chief operator position soon to be vacated. She said the manager had told her that, while her record as a toll operator was outstanding, he did not think she had the qualifications necessary to make a good chief operator. She ended with, "And so he put an operator over me who had years less experience than I had, and was not a good toll operator. I think I shall resign. What do you think?"

I happened to know about these two girls. What the writer of the letter said was true in all respects. So I sent her this message as my answer:

If we have no particular talent, let us use what we have and remember, "The woods would be very silent if no birds sang there except those who sang best."

## In the Nation's Capital

*(Continued from page 13)*

telephones. That's twice the number a few years ago and 10,000 of the gain has been in the last year."

* * *

Incidentally, if you want to get some representative idea as to just how short the nation is of certain raw materials, here is a plan worked out by Robert E. McConnell, chief of OPM's Conservation and Substitution Section. Mr. McConnell has listed 16 industrial materials with the ratio of civilian demands to available supply (after defense needs):

| | | | |
|---|---|---|---|
| Aluminum | 15 to 1 | Plastics | 3 to 2 |
| Copper | 5 to 2 | Tin | 3 to 2 |
| Alloy steels | 2 to 1 | Zinc | 3 to 2 |
| Nickel | 2 to 1 | Rubber | 10 to 7 |
| Tungsten | 2 to 1 | Nitrates | 8 to 7 |
| Chromite | 3 to 2 | Power | 10 to 9 |
| Manganese | 3 to 2 | Steel | 10 to 9 |
| Mercury | 3 to 2 | Lead | 1 to 1 |

Most of these materials are already under priority control—all of them soon will be under such control. In addition, there is a critical list of some 300 items on which Army and Navy orders get first call.

Another angle of this priority administration which cannot be overlooked is the possibility of throwing an entire industry into the ash can and creating serious bald spots of unemployment on our economic map.

* * *

In future discussions in this department on the increasingly important subject of price control (on which President Roosevelt was expected to send a message to Congress this week), your correspondent will endeavor to analyze the problem of small business survival in an atmosphere of monopolistic control such as price control and priority rationing. It is going to be quite difficult.

During the last war, Bernard M. Baruch was willing to list only 25 industries which could be unquestionably classified as non-defense industries. Leon Henderson, OPACS chief, has already stated that he would be unwilling to say that such a business as candy-making would be necessarily a luxury business during the defense emergency.

## WISE SALES TIPS

*Are "Territories Different"?*

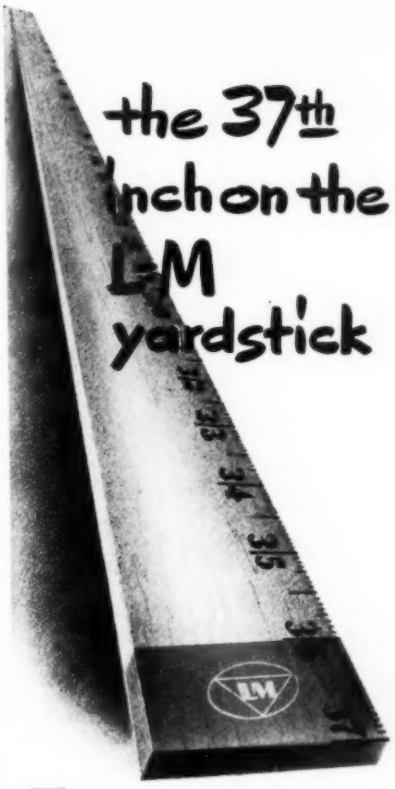
By W. L. HUDSON

AS IS GENERALLY understood, when we speak of territory, which is a physical thing, we mean people who occupy it. Now we have previously said that people, generally, have the same desires. Therefore, the difference is not in the people but in their circumstances; that is, some have more money to spend than others. But this is true of every territory. Doesn't it appear then that when a salesman mentions "poor" territory he actually is thinking more of the physical aspect than he is of the people?

I recall an experience where a crew of 10 door-to-door salesmen were assigned to a section occupied largely by first generation foreigners. None of the salesmen had ever worked such a territory and all, except one, "flopped" the first month. The one man, who was always a leader in his crew, brought in his usual number of sales.

*I think the other nine defeated themselves by assuming that because sales were harder to get they couldn't be obtained.* When we reason the thing out it seems that "poor territory" is generally just a bogey man in the minds of certain salesmen.

[EDITOR'S NOTE: *This is the fourth article in a series; the last one appeared in the June 7 issue.*]


**The competition towered forbiddingly high back in 1911, when L-M hung out its shingle, youngest, smallest manufacturer serving the utilities. But the 37th inch on the L-M yardstick—personal attention—somehow seemed to compensate for early limitations...led to the L-M research division with its long list of notable contributions to improved equipment and service.**

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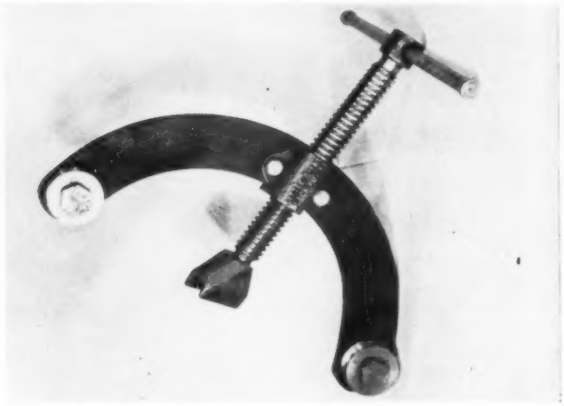

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XUM

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*(Concluded from page 10)*

ward giving our customers the kind of service they want.

Our girls know how to operate their switchboards. They know that they must be courteous, pleasant, agreeable. They know that good service is prompt, accurate, courteous service.

Our commercial employes who receive customers at the business office, or who answer telephone calls, have learned that good service is service with a smile.

The plant man knows that good workmanship—workmanship with a smile, if you please—makes for a favorable attitude toward his company.

Our accounting people who carry all the burden of keeping books, counting, sorting, listing toll tickets and preparing invoices every month have learned that they have a responsibility to make our invoices clear, clean and accurate.

We know a lot, BUT, how do we perform when the irregular or unusual thing comes up; the thing which isn't strictly routine or the thing which calls for extra tact?

Do we always do such a fine job when a customer comes to us with what he thinks is a legitimate complaint and fails to see our side of the question? Do we always do such an outstanding job when we are trying to collect a bill from one of those habitual "slow-pay" customers? Do we always use the same methods when we are dealing with the barefoot boy, or the old lady with an accent, or the man with overalls as we do with the lady in furs, or the man in a cutaway coat? Are there some of us who get the attitude, when the going's rough, that we're pretty good; that we know just about all there is to know about this business; that the business is our province and when we set up some rules, those rules are just about right?

Certainly, we have to live up to certain rules and regulations. Certainly our practices and rates and all that sort of thing are pretty much under government supervision and we can't discriminate. We know all that. But we *can* be thorough, clear, courteous in our explanations.

Business is the means of producing the things men live by—the necessities of food, clothing and housing; entertainment and luxuries. It is the essence of life and the most useful activity of mankind.

The men who conduct it are the players of the game. The lawyers and doctors—men of the so-called professions—interpret rules and tend the players. These professions have worked out a relationship to the public, a code of conduct for themselves, and a basis for high morale. They have made their contract with the public.

Businesses, each one separately, have the same thing to do. Public relations is the art of adapting business to the public so that it will have confidence that it is being well and reasonably served, with the result that business will have sufficient freedom of operation to serve it well.

Public relations is a two-way activity. It interprets the public to a business and the business to the public. It covers the whole field of operations—of policies and practices in every contact with the public—not alone a program of advertising or selling. It covers every action of the business.

There is no recipe for the cultivation of public relations. It is just like the holiday spirit. If we do not have the desire to serve in our hearts, then no amount of teaching and defining will help. If, in our every contact with the public, we convince the public that we are here to serve it and do it with willingness and pleasure, then we are doing our bit in the matter of public relations.

[EDITOR'S NOTE: *This article was presented as an address by Mr. Huether before the recent convention of the Pennsylvania Independent Telephone Association.*]

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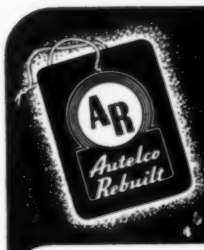
J. W. Holt, owner, Stillwell (Okla.) Telephone Co., recently converted his exchange at Stillwell from magneto to common battery operation. He also secured a readjustment of rates to fit the improved service.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## "Telephony's" Engineering Data

By J. ERNEST HARTZ

Index, Underground Conduit Construction. July 26, 1941. No. 3-B, page 4.

### Materials and Equipment for Underground Conduit Construction (Continued)

| No. Ducts M.C.C. | Concrete: Mixture Volume (cu. yds.) | 1 Cement (bags) | 4 Sand (cu. yds.) | 8 Stone (cu. yds.) |
|---|---|---|---|---|
| 2 | 3.4 | 11 | 1.6 | 3.2 |
| 4 | 4.1 | 13.3 | 2.0 | 4.0 |
| 6 | 4.8 | 15.6 | 2.3 | 4.6 |
| 8 | 5.7 | 18.5 | 2.7 | 5.4 |
| 9 | 5.4 | 17.5 | 2.6 | 5.2 |
| 10 | 6.4 | 20.7 | 3.1 | 6.2 |
| 12 | 6.4 | 20.7 | 3.1 | 6.2 |
| 15 | 7.1 | 23.0 | 3.4 | 6.8 |
| 18* | 7.7 | 24.9 | 3.7 | 7.4 |
| 18† | 8.0 | 25.9 | 3.8 | 7.6 |
| 20 | 8.0 | 25.9 | 3.8 | 7.6 |
| 24 | 8.7 | 28.2 | 4.2 | 8.4 |

* Conduit cross-section made up of two nine-way M.C.C.

† Conduit cross-section made up of three six-way M.C.C.

**Table 5. Material for Complete Encasement of Multiple Clay Conduit (per 100 feet of trench)**


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Daniel H. McNulty, Manager

*"Free Bulletin"*

Rogers Park Station Chicago


## "Telephony's" Engineering Data

By J. ERNEST HARTZ

Index, Underground Conduit Construction. July 26, 1941. No. 3-B, page 5.

For convenience in making up a list of materials needed for underground conduit construction, or for checking supplies of materials on hand, articles required are listed alphabetically as follows:

**Anchors:** *¼ by 1½-inch screw anchors* for use with 2-inch No. 14 round head, galvanized wood screws.

*⅜ by 1½-inch screw anchors* for use with 2-inch No. 18 round head, galvanized wood screws.

**Bandage:** *Unbleached cheesecloth, or new non-oxidizing cloth,* in strips six inches wide, to wrap joints of clay conduit before applying mortar. Usually available in rolls of not less than 36 yards.

**Bars:** *½-inch square cold twisted steel bars* to reinforce manhole tops. Usually these bars will be sawed into the required lengths by the dealer supplying the iron, at little or no additional cost.

**Bends:** *No. 2 cast iron bends* to terminate subsidiary ducts on poles and buildings.

*No. 2-L cast iron bends* to terminate subsidiary ducts on poles and buildings when additional depth is required on account of curb, etc.

**Brick:** *Hard burned brick* to build manhole collars for the purpose of raising, or allowing future lowering, of manhole cover to grade.

**Bolts:** *½ by 2½-inch galvanized machine bolts,* without nuts, for use with concrete insert or expansion shield.

*½ by 2½-inch galvanized machine bolts* complete with shield.

**Caps:** *No. 2-2 cast iron caps* to connect No. 2U cable guards to No. 2 or No. 2L cast iron bends.

**Castings:** *Type A conduit casting* to connect single vitrified clay conduit to three-inch iron pipe.

*Type B conduit casting* to connect two-duct vitrified clay conduct to three-inch iron pipe.

## "Telephony's" Engineering Data

By J. ERNEST HARTZ

Index, Underground Conduit Construction. July 26, 1941. No. 3-B, page 6.

*Type C conduit casting* to connect three-duct vitrified clay conduit to three-inch iron pipe.

*Type D conduit casting* to connect four-inch vitrified clay conduit to three-inch iron pipe.

*Type E conduit casting* to connect six-duct vitrified clay conduit to three-inch iron pipe.

*Type F conduit casting* to connect nine-duct vitrified clay conduit to three-inch iron pipe.

*Type G conduit casting* to connect two-duct vitrified clay conduit to three-inch vitrified clay sewer pipe. May be used with three-inch iron pipe by placing coupling on end of pipe.

*Type H conduit casting* to connect three-duct vitrified clay conduit to three-inch vitrified clay sewer pipe. May be used with three-inch iron pipe by placing coupling on end of pipe.

*Type I conduit casting* to connect three-inch creosoted wood conduit to three-inch iron pipe.

*Type Y conduit casting* to connect three-inch creosoted wood conduit or single vitrified clay conduit to three-inch iron pipe bends or to No. 6 reducing coupling.

**Cement:** *Portland cement* for mortar and concrete.

**Clamps:** *Cable clamps* to clamp cable where necessary.


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## Elements of the Telephone

*(Continued from page 15)*

that a rising current in the primary will cause a current to flow in the secondary, but in the opposite direction. Looking at B and applying the rule of electromagnets, we find that the field set up by the electromagnet of the receiver is of the same polarity as that of the permanent magnet. Therefore, the pull upon the receiver diaphragm is increased, causing it to take a more concave position as shown by the solid line E, representing the diaphragm. (The dotted line represents the original position.)

Turning now to C, we find that the transmitter diaphragm is decompressed, thus causing a fall in the current flow through the primary. We found in a preceding article that as the primary current falls in strength, an induced voltage in the secondary will cause a secondary current to flow in the same direction as that in the primary. Now, by again applying the rule to this condition, the current flowing through the receiver will set up a magnetic field in opposition to that of the permanent magnets, causing a weakening of the pull upon the diaphragm. In this way, the diaphragm will take a more normal position as shown in the illustration at F.

Therefore, we can readily see that as sound strikes the diaphragm of the transmitter, a rising and falling current is obtained which, in turn, will cause current to flow in the secondary of the induction coil. This current is of an alternating nature and can be transmitted over great distances and then by the aid of the receiver changed back into sound waves.

These are the fundamental principles of speech transmission. Although the several manufacturers employ slightly different methods, the basic principle is essentially the same.

*(To be continued)*


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Yours truly,
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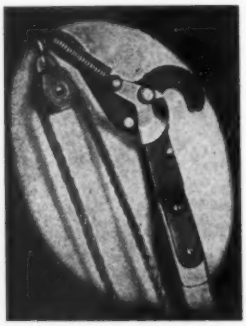

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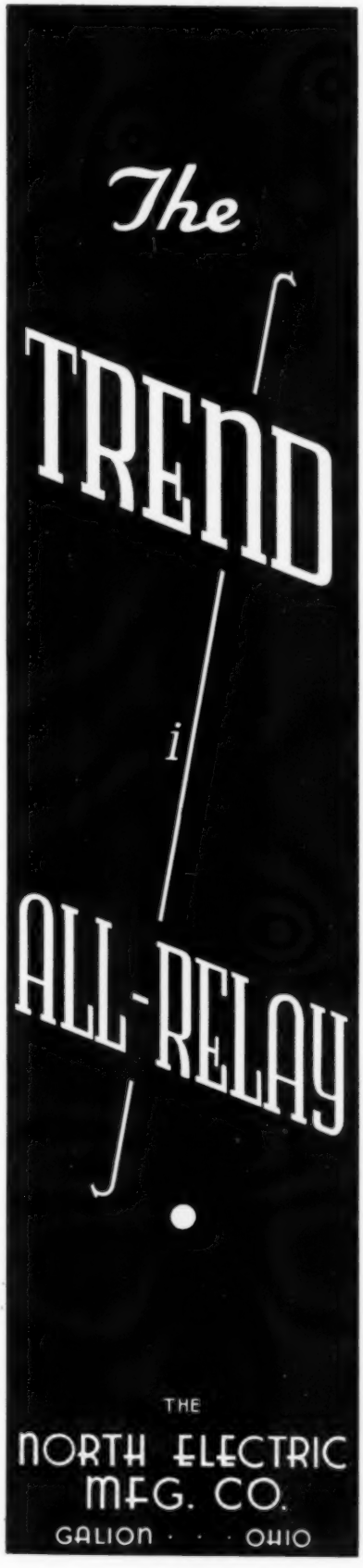

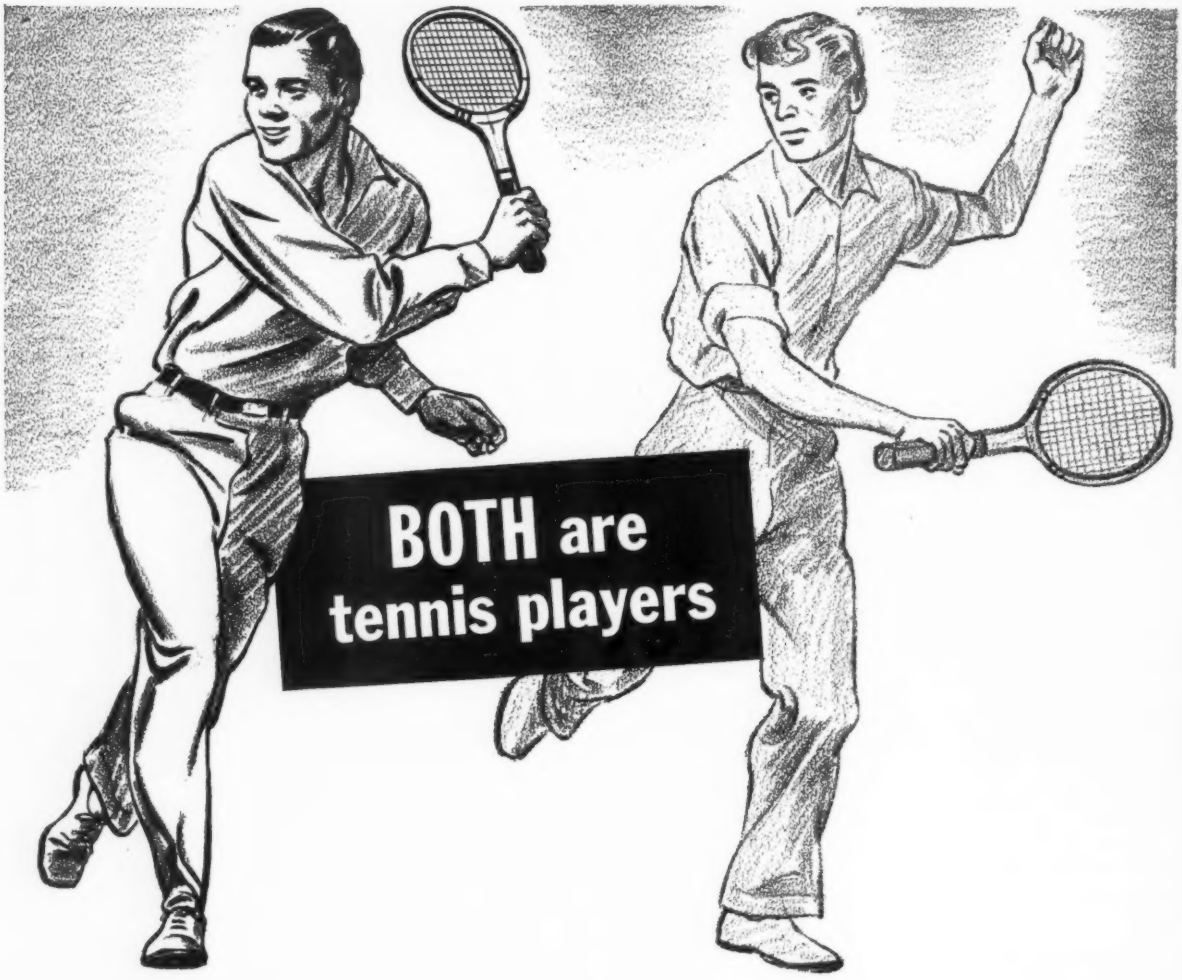

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